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[p. 2-A]

Fig. 1 Relief Map of Malta and Gozo.

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MALTA & GOZO.
RELIEF
ST. JULIAN'S
MELLIEHA
MGARR
ZEBBUG
MTARFA
HAL GHAXAQ
ZEJTUN
QRENDI
MTAHLEB
HAL KIRKOP
HAL LUQA
HAL FARRUG
HAL SAFI
HAL MIKABBA
HAL GHAXAQ
HAL KALI
HAL GHARGHUR
HAL SIGGIEWI
HAL MTARFA
HAL MELLIEHA
HAL GHARGHUR
HAL KALI
HAL SAFI
HAL FARRUG
HAL LUQA
HAL KIRKOP
HAL GHAXAQ
HAL ZEJTUN
HAL QRENDI
HAL MTAHLEB
HAL ZEBBUG
HAL MGARR
HAL MELLIEHA
HAL SIGGIEWI
HAL MTARF

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MALTA

Background for Development

H. Bowen-Jones J. C. Dewdney W. B. Fisher

Department of Geography Durham Colleges
in the University of Durham

[P.3]

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INTRODUCTION

The distinctive qualities of Malta first exerted their attraction on us over fifteen years ago. In 1954 an opportunity for closer study occurred and we developed the idea of undertaking some form of geographical survey. 114 121

When the authors made a preliminary survey of documentary source material, their first reaction was one of surprise at the relative paucity of literature available: although since that time there has been an improvement in the quality, extent and accessibility of studies relating to the Islands, this original impression persists. Smallness in overall area and in population numbers might be held responsible for such a limited degree of intellectual interest; and yet the true importance of Malta has been out of all proportion to mere size. The number of references quoted below might seem a rebuttal of these assertions. Indeed in total amount the material extant is superficially impressive. However, with certain significant exceptions, many studies prove to be unreliable either because of their uncritical acceptance of earlier dicta, or because analyses are relatively superficial in that they lack foundation upon direct observation and on the cross-checking given by comparative studies in related fields. These introductory remarks are intended not as complacent and destructive criticism but rather as a partial explanation and justification of the wide but not definitive range of our work. The research on which our book is based commenced as a sample study of land utilization. Because however of the difficulty of accepting other than very few statements as authoritative it became essential to undertake simultaneous inquiries in varied fields.

Equally important as a reason for attempting a relatively comprehensive coverage of affairs Maltese is the fact that in these strange, perhaps unique, islands the interweave of human and non-human elements is so close. Approach to a single isolated problem leads extraordinarily rapidly to all other parts of the complex, more quickly and completely than we have observed elsewhere. Whatever the starting point; micro-climate or semantics, hoe-types or constitutional history, any sustained investigation involves a mass of varied but inter-related problems. 114 121 182

The first simple project evolved for these reasons into a complex scheme carried out under the auspices of two Universities, two Governments, and in association with two Civil Services as well as other organizations, British, Maltese and international. We have therefore also experienced the need and received the opportunity of testing and experimenting with various techniques of geographical research. Circumstances allowed the participation of a relatively large number of workers of differing levels in experience. Besides full-time researchers at postgraduate level and a number of university teachers who made Malta a specific interest, there was scope for drawing upon the energy and enthusiasm of undergraduate members of the Department. In this way, the terrain could be fully covered and geography practised through the soles of the feet, with every part surveyed by personal observation on the ground. During the more or less parallel investigations therefore made necessary it has been possible to reconcile the methods of team research without restricting the freedom of the individuals concerned, whilst at the same time the Field Directors have been able to survey the whole of the work and take part in all of its constituent elements. It has been very reassuring to find that the checks provided by consequent overlapping have been consistently favourable. 114

As professional geographers, we welcome an opportunity of stating a belief that has lain in our minds throughout our work in Malta and elsewhere, and that experience has only served to confirm. This is that geography implies first, field observation of conditions relating to the way men live; secondly a willingness to trace a relationship through, and if necessary beyond the formal bounds normally assigned to a particular academic discipline. Thirdly, in order to give the whole process form and meaning, the operation must be rooted in a physical regional framework - this is what makes our approach 'geography' rather 121

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121 than sociology. All that we attempt to observe, explain and compare occurs on or near a particular expanse of the earth's surface hereby conferring a unity to the studies we undertake.

The project thus far has been mainly designed to cover the agricultural sector (with all that that implies), but the impossibility of isolating any single segment of Maltese life has provided us with full justification for frequent divergence. Not only is it impossible to consider any element solely from the point of physical production; it becomes necessary to consider the wider and finally often more important factors such as, among others, social status, adaptability to change, and mental as well as physical climate.

We are therefore led to the belief that the facts here presented have an applicability wider than that to Maltese agriculture alone. It is not intended to produce a plan for specific lines of development - we feel strongly that this is not our function. Instead, we hope that our study will provide a background for development, the establishment of a factual corpus of knowledge that will allow development and future policy making by others.

In the case of the Maltese Islands, as in many other regions, such provision is not only necessary but imperative. During this century there has occurred a striking alteration of the status and importance of many dependent territories and newly independent states. Such rather sudden revaluations, inevitably consequent on erratic reactions to changing circumstances, are historically normal. Hitherto, however, resulting changes in sovereignty and economic and cultural ties have taken little account of the desires of the peoples concerned. Today, new ideas of political status are paralleled by ideas of development and 'natural rights' on the economic plane. Much of this, it is true, is a historical difference of degree rather than of kind. Although Malta for 5,000 years has always been part of some larger socio-cultural or political unit, it has always maintained a certain especial status of autonomy. Equally in the economic sector there has always existed some insular and independent activity. Nevertheless, more than ever before, the Maltese are and feel they are themselves now responsible for their socio-economic destinies. With such a responsibility, there arises a need, not always wholly welcome, and at times conceded only with reluctance, firstly for knowledge of basic facts relating to existing institutions, and secondly, for sympathetic understanding and appraisal of these facts. It is our earnest hope that this present work, which amounts to an extensive abstract of investigations and reports which are in themselves too specialized and lengthy for normal publication, will assist toward such an understanding.

128 The arrangement of the subject matter has been chosen in order to suit the attempt at integrating diverse but relevant material. Section One is devoted to studies of the physical environment. To the non-specialist much of it may appear prosaic and 'earthbound' but, as will appear, without such appraisal of limitations and possibilities any socio-economic analysis would remain overspeculative. In Section Two are considered the societies which have both left their impress on the landscape and produced cumulative responses to environment. Section Three contains studies of the contemporary rural scene: many of these directly and indirectly also help an understanding of non-agricultural activities. The concluding Section Four is an attempt to select and inter-relate the ideas and themes which have seemed to us of the greatest importance, and to present them in a single impression of the continuum which is Malta.

122 It remains to particularize, with deep gratitude, the assistance received during our investigations. Original interest, a kind of priming of the pump, came from Sir James Duff, then Warden of the Durham Colleges; and next, the support of the Colonial Economic Research Council, which provided financial backing for a large part of the survey. The Government of Malta also associated itself with the scheme, and provided powerful and indispensable support, financial and technical, especially through the Office of the Prime Minister, and Minister for Agriculture and his officials. As well, contacts with all officials of the Government, Imperial and National, were extremely fruitful, and personally most cordial.

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The Royal University of Malta, through its Rector Magnificus, its Professor of Economics, and Registrar also gave much valued collaboration; and further academic assistance came from Brother Leo Barrington, until recently Principal of St. Michael's Training College for Men, Valletta. A final but none the less sincere expression of appreciation concerns the long-suffering farmers, who submitted with excellent grace to inquisition, disquisition, and even perquisition. To all these individuals we offer thanks, and the hope that their recollection of our presence will be as agreeable as are our memories of their Islands generally. 122

H. B-J., J. C. D., W. B. F.
Durham, June 1960.

CONTRIBUTORS TO THE MALTA PROJECT

The present volume draws upon and summarizes the findings of research and observation carried out by a relatively large group of individuals. Much has been omitted or greatly abbreviated but it is proper that the names of all participants in the Malta project should be recorded. 114

There are first the collaborators in the volume, Professor K. C. Dunham, F. R. S., Dr. M. House and Mr. J. C. Wigglesworth of the Department of Geology, Durham Colleges in the University of Durham, who are responsible for Chapter 1(A); and Mr. D. Lang of the Soil Survey of Great Britain, who has contributed Chapter 3(A). As well, we acknowledge with deep appreciation the general co-operation of Dr. R. Cirillo, Professor of Economics, and Dr. J. Aquilina, Professor of Maltese Language, both of the Royal University, Valletta.

The others, whose names are given below, are past or present members of the Department of Geography, Durham Colleges.

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J. C. Dewdney, M. A. Edin. Lecturer. }

C. E. R. C. Research Fellows in Malta, 1956-'58.
P. K. Mitchell, B. A. Dunelm. (Lecturer at University College of Sierra Leone).
B. W. Beeley, B. A., Ph. D. Dunelm. (Research Fellow in Middle Eastern Studies, Durham Colleges).

Postgraduate Research Workers.
W. A. Charlton, B. A., Ph. D. Dunelm } Malta 1955, '56, '57.
M. Richardson, B. Sc., Ph. D. Dunelm }
R. W. Hill, B. A. Sheff., Ph. D. Dunelm Malta 1957

Land Use Survey Parties.	
F. H. Andreason-Aalen, B. A. Dunelm	Malta 1955
J. A. Allen, B. A. Dunelm	Malta 1956
B. P. Birch, B. A. Dunelm	Malta 1957
K. S. MacLachlan, B. A. Dunelm	Malta 1956
P. K. Mitchell, B. A. Dunelm	Malta 1955
B. E. Roberts, B. A. Dunelm	Malta 1955, '56
A. R. Taylor, B. A. Dunelm	Malta 1957
S. A. Taylor, B. A. Dunelm	Malta 1955
I. B. Thompson, B. A. Dunelm, M. A. Indiana	Malta 1956
K. G. Wardhaugh, B. Sc. Dunelm	Malta 1956, '57
B. F. Wooten, B. A. Dunelm	Malta 1957
J. F. Yaxley, B. A. Dunelm	Malta 1956

General Director of the Research Project.
Professor W. B. Fisher, B. A. Manc., Doct. d'Univ. Paris. Malta 1948, '52, '53, '57, '58.

ESSENTIAL STATISTICS

131 The Maltese Islands - Land Area 121.850 sq. miles, Population 323,667[1].
161 Malta - Land Area 94.876 sq. miles, Population 296,008[1].
Gozo and Comino - Land Area 26.974 sq. miles, Population 27,659[1].

162 A. OCCUPATIONAL STRUCTURE OF THE POPULATION[2]

463 (i)	Civil Government	17,050
	Service Departments	22,480
(ii)	Agriculture, Fishing and Quarrying	9,130
	Manufacturing	9,030
	Construction	7,220
(iii)	Wholesale and Retail Trades	10,920
	Transport and Communications	3,650
	Insurance, Banking, etc.	550
	Gas Service	20
(iv)	Recreation and Personal Services	7,250
	Community and Business Services	1,140
	Total	88,710

433 B. PRODUCTION[1]

Gross Domestic Product 1957	£ m.	36.1
Gross Industrial Production 1957	"	10.036
Gross Agricultural Product 1957	"	5.008

439 C. TRADE[3]

(i) Commodities (value in £m)

	Imports	Exports	Re-exports
Food, Drink, Tobacco	9.411	.547	.549
Raw materials and materials mainly unmanufactured	3.227	.312	1.307
Articles wholly or mainly manufactured	13.215	.132	.404
Miscellaneous and unspecified	2.862	.005	.339
Bullion and Specie	.104	-	-
	28.820	.995	2.600

(ii) Direction of Trade (%)

	Imports	Exports
Sterling Area	49.3	41.1
Dollar Area	7.2	.5
O. E. E. C.	33.5	10.4
Other	10.0	2.1
Ships and Aircraft Stores	-	45.6
	100	100

(iii) Balance of Trade

	Imports	Exports & Re-exports	Negative Balance
		Million £	
1949	15.312	1.038	14.274
1954	20.407	2.879	17.528
1958	28.820	3.595	25.225

(Since 1948 the adverse trade balance has increased by an average of 4.7% per annum)

D. SEABORNE AND AIRBORNE TRAFFIC 1958[3].

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509

	Total - Calling - British				Passengers (No.)			Freight (Tons)	
	Number	Tonnage	Number	Tonnage	In	Out	Transit	In	Out
Steam Vessels	1,792	2,006,003	458	1,346,925)	9,852	10,745	35,175	568,626	54,927
Sailing Vessels	267	22,836	15	122)					
Aircraft	3,283	91,081	3,116	87,897	20,232	31,501	28,848	588	238

E. AGRICULTURE[4]

		Acreage	Yield-tons
(i)	Total Area cultivated	44,235	
(ii)	Wheat	5,000	3,000
	Barley and Mixta	4,083	2,158
	Forages (inc. sulla, vetches & Ferrana)	11,824	3,855
	Broad Beans	1,250	500
(iii)	Potatoes - Spring crop	4,763* (1957-6,000)	15,420
	- Winter crop	3,228	7,360
	Melons	1,837	1,939
	Onions	1,263	3,389
	Tomatoes	1,912	8,588
	Other vegetables	5,000	16,198
(iv)	Grapes	5,000	6,000**
	Citrus	160	500**
	Other fruit	1,000	6,000**
(v)	Cotton	3 (1956-187)	1
	Cumin Seed	8 (1952-518)	2

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* Note. Abnormally low.
** Note. Acreage and yield of treecrops in particular should be treated as indicating only orders of magnitude.

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(vi)	Livestock (Enumeration)		
	Horses, Donkeys and Mules	6,575	
	Goats	36,944(1950-50,159)	
	Sheep	15,011(1950-20,148)	
	Imported Store bulls	3,081	
	Milk cows	4,178(1950- 2,861)	
	Other cattle	2,466	
	Swine	16,362	
(vii)	Number of holdings		12,192
	Number of mechanized implements - 2 wheeled		700
	- 3 & 4 wheeled		54
	- tracked		25
	- milking machines		7
	- threshers		22

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439 F. TRADE IN SOME AGRICULTURAL PRODUCTS AND FARM MATERIALS 1958[3].

	Imports Value £000	Exports & Re-Exports
Food grain and manufactured grain	1,862	18
Meat	1,048	23
Animal feeds	2,785	-
Potatoes	132(1957-99)	353(1957-104)
Fruit and vegetables	891	09
Milk	616	1
Butter, butter subs. and cheese	704	-
Edible vegetable oils	287	-
Eggs	263	-
Wines	74	15
Store bulls	528	-
Fertilisers	32	-
Agricultural implements & machinery	103	-

113 1. Report of the Central Office of Statistics 1958/59. Malta 1959.
2. Annual Report of the Dept. of Emigration and Labour 1958-59. Malta 1959.
3. The Trade of the Maltese Islands 1958. Malta 1959.
4. Report of the Census of Agriculture 1958. Malta 1960.

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SOME MALTESE WEIGHTS AND MEASURES

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UNIT		EQUIVALENTS	
	Maltese	British	Metric
LENGTH			
Pulzier (pollice)	-	0.850 ins.	21.83 mm.
Xiber (palmo)	12 Pulzier	10.312 ins.	26.19 cm.
Qasba (canna)	8 Xbar*	2.292 yds.	2.095 m.
AREA			
Qasba Kwadra	-	5.252 sq.yds.	4.391 sq.m.
Kejla	-	22.410 sq.yds.	18.735 sq.m.
Siegħ (mondello)	10 Kejliet*	224.100 sq.yds.	187.354 sq.m.
Tomna (tummolo)	6 Sieghan*	0.278 acre	0.112 ha.
Modd (salma)	16 Tmien*	4.444 acres (1 acre=3.6 tmien)	1.796 ha.
WEIGHT			
Uqija	-	0.933 oz.	0.026 kg.
Rtal (rotolo)	30 Uqija	1.750 lbs.	0.793 kg.
Wiżna	5 Rtal*	8.750 lbs.	3.968 kg.
Qantar	20 Wiżna	175.000 lbs. (1 ton=12.8 Qantar)	79.378 kg. 1016.128 kg.
BUNDLE MEASURE			
Qatta, Xibka, Xkora, (sheaf of sulla, wheat, etc.)		-	-
Hemel (somma)	10 Qattiet* in Malta	-	-
	8 Qattiet in Gozo	-	-
CAPACITY: DRY GOODS			
Tomna (tummolo)		0.0625 qrs.	0.1818 hl.
Modd (salma)	16 L'Tomna	8.0 bushels	2.909 hl.
CAPACITY: OIL & MILK			
Terz	-	0.281 quart	0.32 lit.
Nofs	2 Terzi*	0.562 quart	0.63 lit.
Kartoċċ	2 Nfas*	1.125 quart	1.27 lit.
Kwarta	4 Krateċ*	1.125 galls.	5.11 lit.
CAPACITY: BEER, WINE & SPIRITS			
Pinta	-	0.25 pint	0.142 lit.
Terz	2 Pinet*	0.50 pint	0.284 lit.
Nofs	2 Terzi*	1.00 pint	0.561 lit.
Kartoċċ	2 Nfas*	2.00 pints	1.136 lit.
Kwarta	4.75 Krateċ*	1.187 galls.	5.396 lit.
Garra	2 Kwarti*	2.375 galls.	10.797 lit.
Barmil (Barrel)	4 Garar*	9.500 galls.	43.187 lit.

Note the following plural forms identified by an asterisk * in the table above:- Garar (s. Garra), Krateċ (s. Kartoċċ), Kejliet (s. Kejla), Kwarti (s. Kwarta) Nfas (s. Nofs), Pinet (s. Pinta), Qattiet (s. Qatta), Rtal (s. Ratal), Sieghan (s. Siegħ), Terzi (s. Terza), Tmien (s. Tomna), Xbar (s. Xiber), Wiżniet (s. Wiżna).

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MALTESE ORTHOGRAPHY, PRONUNCIATION AND PLACE-NAME ELEMENTS

The notes which follow are intended to assist the reader in the pronunciation of place names and other Maltese words occurring in the text. Certain letter symbols occur in the Maltese alphabet which are not found in English, while others have pronunciations very different from the English ones.

The special symbols involved are as follows:-

H, h. Where this letter occurs alone, it is strongly aspirated. The nearest equivalent in English is the "h" in "house" but in Maltese the aspiration is even stronger. Thus Mellieha will be pronounced Mellie-ha.

GH, gh. This is, in effect, a single letter and represents the Arabic 'ain. It is now almost silent in standard Maltese but is sounded, as in Arabic, in some rural dialects.

Ċ,ċ; Ġ,ġ; Ż,ż. A dot placed over these consonants indicates a softening in pronunciation. Thus "c" occurs in Maltese only in loan words where it retains the pronunciation of the original language, while "ċ" represents "ch" as in English "church". "G" is hard as in English "garden", "ġ" soft as in English "jam". "Z" is pronounced as "ts" in English "its", "ż" as "z" in English "zebra".

Consonants with "non-English" values are:-
J, j pronounced as "y" in English "yet".

Q, q in standard Maltese has assumed a glottal value but is still pronounced "k" (as in Arabic) in some local dialects.

X, x is universally pronounced "sh" as in English "show".

There is some slight variation in the pronunciation of vowels but the following values are predominant:-

A,a as "a" in English "far"
E,e as "e" in English "bet"
I,i as "ee" in English "feel"
O,o as "o" in English "lock"
U,u as "oo" in English "boot"

When followed by j, "e" and "a" have special values:-

-aj- pronounced as "i" in English "ice"
-ej- pronounced as "e" in English "they"
-ie- pronounced as in English "pier"

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Space does not permit of any but the most cursory mention of the significance of the great range of Maltese place-name elements. As a result of the help received from Professor J. Aquilina of the Royal University of Malta the authors were able to increase their understanding of Maltese life and landscape by using to some extent this and other philological evidence. The reader will similarly gain in understanding by an appreciation of even a few place-name meanings.

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COMMON PLACE-NAME ELEMENTS	
Ahrax	Rugged
Bahar	Sea
Bir	Well; but could also be a phonetic corruption of "Bur" = natural pasture land
Blata	A rock
Casal	Village
Ġebel	Rocky Hill
Ghajn	Spring
Ghar	Cave
Ġnien	Orchard or garden
Hal	Village
il-, iċ-, id-, in-, ir-, is-, it-, ix-, iż-	The
Kbir	Large; Great
Marsa	Harbour
Misrah	Wide open space
Nadur	Look-out point
Qala	Bay or inlet
Qortin	A dry, flat-topped promontory or bluff
Ramla	Sandy Bay
Ras	Headland
Rdum	Undercliff
ta'	Of
tal-, taċ-, tad-, tan-, tar-, tas-, tat-, tax-, taż-	Of the
Torri	Tower
Wied	Valley
Xagħra	Wasteland

Several further place-name groups may be distinguished. Some obviously refer to topographic features: Wied il-Ghajn; valley of the spring: Wied il-Kbir; the great valley. Others are related to crops: Wied il-Ħemsija; valley of the chickpeas. Another group refer to stock rearing: tal-Merħla (the place) of the flock of sheep; or to cultivation in a general sense; Wied il-Ġnejna; valley of gardens or orchards. In other cases uncultivated vegetation is referred to: Besbesija; the place where fennel grows, or Wied ta, Ghajn Rihana; valley of the myrtle spring. Again there is a group of names emphasizing some feature of the landscape in general: il-Wilġa; land overlooking a valley: il-Miċieb;(land with) drains. Many others are derived either from proper names: tal-lombardi, nicknames; Wied Bobu: or Saint's names; San Rokku. In the last case, the names are often derived from a local church or chapel and care must be taken to avoid false conclusions. Tas-Silġ; (of ice or snow) refers to the chapel of the Madonna of the snows and not to a meteorological phenomenon.

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SECTION 1

THE LAND

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Fig. 3 Geology of Malta and Gozo.

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Chapter 1

A. GEOLOGY AND STRUCTURE OF THE MALTESE ISLANDS

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INTRODUCTION

The central Mediterranean islands of Malta, Gozo and Comino lie 58 miles due south of Sicily, 220 miles due north of Tripoli and about 180 miles east of Tunis. The Maltese archipelago trends north-west to south-east and is 28 miles in length. Malta, the largest and most southerly island, is 17 miles in length and nine miles wide and has an area of 95 square miles. Gozo is nine miles long, up to four miles wide, and has an area of 26 square miles. The island of Comino, in the Comino Strait separating the two islands, occupies only one square mile. A submarine ridge, averaging 50 fathoms in depth, extends southwards from the Ragusa peninsula of Sicily towards the islands, and it continues on as a broader and deeper shelf to the African coasts of Tunisia and Tripolitania. This submarine ridge, which separates the Mediterranean into two main hydrographic basins, represents a sunken land bridge which connected Africa and Europe during parts of the Pleistocene and later Tertiary.

The islands are entirely composed of Tertiary limestones with subsidiary clays and marls. Superficial deposits, mostly Pleistocene in age, take the form of cliff breccias, cave and valley loams, sands and gravels. The succession of Tertiary rocks on the islands is as follows:-

		Feet
5. Upper Coralline Limestone	at least	530
4. Greensand		0-50
3. Blue Clay		0-230
2. Globigerina Limestone		75-680
1. Lower Coralline Limestone	at least	626

The Lower Coralline Limestone and Lower Globigerina Limestone belong to the Aquitanian stage and the Middle and Upper Globigerina Limestone and Blue Clay to the Burdigalian. The Helvetian is represented by the Greensand and the Tortonian by the Upper Coralline Limestone. All these stages fall within the Miocene period, following Eames' recommendation that the Aquitanian is Miocene rather than Oligocene.

The strata have an undulating regional dip to the south-east and the islands are cut by a system of normal faults, striking ENE., which affects Malta especially and is responsible for cutting that island into a series of horst and rift blocks.

The first description of the geology of these islands was given by Commander T. A. Spratt (1843 and 1852) and later a general account was given by Murray (1890) and his work stimulated others, especially Cooke (1893, 1893a, 1896, 1896a), to examine the rocks in more detail. During this century Rizzo (1932), Paver (1943), Sir E. B. Bailey (1943) and Morris (1952) have added detail mainly in connection with an examination of the water resources of the islands. Recently the literature has been reviewed and summarised by Reed (1949) and Ilyde (1955). The fossils have been studied especially by Gregory (1891), Stefanini (1908), Roman and Roger (1939) and Eames and Cox (1956). The interesting fauna of the Pleistocene cave deposits have been described by Cooke (1891, 1896b), Cooke and Smith Woodward (1893) and Bate (1935), and Evans (1954, 1959) has described the prehistoric pottery sequence.

Note: Throughout this chapter, four-figure grid references have been used to locate the south-western corner of the kilometre grid square containing the feature named. The grid in use is that appearing on the standard two-inch map of Malta and Gozo, G.S.G.S. 3859, Edition 4, 1954, and reproduced on Fig. 3 et seq. The Roman numerals refer to regions marked on the inset map of Fig. 3.

133 STRATIGRAPHY

The geological formations of the islands are very distinctive lithologically and this is reflected in the characteristic topography and vegetation which they produce. The Lower Coralline Limestone is responsible for forming the magnificent cliffs, some reaching 450 feet in height, which bound the islands especially to the west: but the rock is tough and intractable and inland usually gives rise to a barren grey limestone-pavement topography. The gentler, terraced slopes which succeed the Lower Coralline Limestone around the cliffs witness to the softer Globigerina Limestone which is the most widespread formation on the islands. It produces rather meagre soils, intensively cultivated, and a gentle, rolling landscape. The overlying Blue Clay, aided by the spring seeps above it, forms the most fertile bedrock on the islands. The outcrop is usually narrow and the slopes steep, but they are carefully terraced and tilled, except in the places where rains have produced unstable clay 'slurries'. The Upper Coralline Limestone caps the tabular hills, some of which reach 800 feet in altitude. These hill tops are typically barren and bare limestone plateaus of karstic types with joint cracks, small solution holes and underground caves.

The Tertiary succession bears a strong resemblance to that of south-east Sicily where a limestone-clay-limestone sequence occurs, and to that of North Africa (Macfadyen 1930). It is comparable to that of the Vienna Basin and representatives of the first Mediterranean stage of Suess (1904) are seen in the Lower Coralline Limestone and of the second Mediterranean stage in the Upper Coralline Limestone. The Blue Clay represents the 'schlier' facies, well developed, though probably diachronous, in the peri-Alpine region from Bavaria westwards. The Maltese sequence also bears a resemblance to that of Sardinia and southern Spain and the West Indies with which Haug has postulated a Miocene geosynclinal connection (Cottreau 1914, Stefanini 1924, Blow 1957).

1. Lower Coralline Limestone

This formation forms the characteristic vertical cliffs around most of Malta south of Fomm ir-Rih (4073) and St. Paul's Bay and also in western Gozo. The most magnificent cliffs are those south of Sannat, Gozo (3186), where 450 feet are exposed. A similar thickness is visible in the less spectacular cliffs near Ghar Lapsi, Malta (4864). The formation continues for a good depth underground and a borehole at Maddalena Quarry, Malta, penetrated 626 feet without reaching the base. Inland the Lower Coralline Limestone is brought up in several inliers, frequently associated with faults. The largest inlier, over one mile in width, is north of Mosta (4873) and Naxxar in central Malta and there is another, half a mile across, around the Attard Lunatic Asylum one and a half miles south of Mosta. This formation has been worked in a small way for ornamental stone on both islands under the name 'zonqor'.

The Lower Coralline Limestone is usually a dense, semi-crystalline, massive to moderately bedded limestone, occasionally silicified, ranging in colour from pure white to red and buff. The rock is largely composed of calcareous algae, especially *Lithothamnium* together with mollusc and echinoid fragments and common Foraminifera. A particularly well developed algal horizon occurs around Attard, Malta, where the limestone is silicified.

At the top of this formation is a characteristic band, a few feet thick, with numerous fossil sand-dollars, called the *Scutella* bed (Roman and Roger 1939). In Gozo and in north, east and south Malta it takes the form of a yellow detrital limestone, coarser than the Globigerina Limestone above, with *Scutella*, *Eupatagus*, *Schizaster*, *Echinolampas*, *Cidaris* and other echinoids with occasional nests of *Lepidocyclina* and *Bryozoa*. In some other places, as in central Malta around Attard and Naxxar, the *Scutella* bed cannot be recognised.

2. Globigerina Limestone

This formation outcrops over large areas in western Gozo and central and southern Malta and it provides the beautiful golden brown building stone, the 'franka', used for most of the buildings on the islands. The formation shows marked thickness variations. The greatest thickness now exposed, about 680

feet, is in southern Malta near Marsaxlokk (5965) and the thinnest, about 75 feet, is below Fort Chambray (3686) in southern Gozo. In general it is thinnest along a line passing north-south through the Comino Straits. 133

The Globigerina Limestone is a fine-grained white to buff calcarenite completely composed of calcareous tests of globigerinids, anomalinids, and other small foraminiferans. Within the formation are developed horizons of phosphatic nodules, usually very thin, and two of these extend throughout the islands and enable a subdivision to be made into lower, middle and upper divisions. These horizons are composed of individual nodules ranging from less than pea size to several inches in diameter. They range in colour from black through dark brown to green and are largely composed of collophane with up to 40 per cent. phosphate of lime in the lower beds.

One of the best exposures of the whole succession is seen near Fomm ir-Rih (4073) on the western coast of Malta. There the Middle and Lower Globigerina Limestone is best seen on the upthrown side of the Victoria Lines Fault at Fomm ir-Rih itself whilst the Upper Globigerina Limestone and the junction with the Blue Clay is seen 1,300 yards to the north-west. The succession is as follows:-

	Feet
3. Blue clay -	seen to 178
2. Globigerina Limestone	
(iii) Upper Globigerina Limestone	
Yellow-orange fine-grained and honeycomb-weathering limestone with abundant pteropods and scattered ferruginous nodules -	23
Light-grey/blue argillaceous marl -	25
Yellow, friable and jointed fine-grained limestone with scattered ferruginous nodules -	28
Yellow limestone as above but with several phosphatic seams (one is developed at Fomm ir-Rih and there forms a marked projecting cornice) -	9
(ii) Middle Globigerina Limestone	
Phosphatic nodule bed with limestone pebbles and abundant corals, fish teeth and other fossils, the whole passing irregularly down into the bed below -	3/4
Light grey to intensely white-weathering chalky limestone with khaki-hearted cherts in the middle portion: several thin nodule seams within it, two well marked ones lie 14 feet and 19 feet above the base -	139
(i) Lower Globigerina Limestone	
Phosphatic nodule bed forming a massive ledge with ferruginous and phosphatic nodules and abundant casts of fossils and fish teeth, etc. -	1
Fine grained yellow limestone with abundant *Pecten* spp. and Bryozoa -	3
Bryozoan and foraminiferan rock -	4
1. Lower Coralline Limestone	
Dense crystallised limestone forming sheer cliffs below -	100

The widespread *Scutella* graveyard, which is not well developed at Fomm ir-Rih, suggests that in upper Lower Coralline Limestone times the sea floor was nearly flat. During the deposition of the Lower and Middle Globigerina Limestone a zone of lesser sedimentation stretched through the Comino Straits while greater accumulation took place in a basin near Valletta and in western Gozo.

(i) Lower Globigerina Limestone: This division is typically a yellow, fine grained, occasionally fucoidal limestone, usually unbedded. It varies from a few feet in thickness, as at Fomm ir-Rih, to more than 300 feet near Valletta. 133 316

133 [316] Malta, and over 70 feet in western Malta. It provides the most important building stone on the islands, the 'franka', which is a very easily cut freestone which is worked in large, vertical sided quarries especially around Mqabba, Malta (5267), Sannat, Gozo (3186) and north of San Lawrenz (2891). The franka when used for exterior work weathers well. The stone develops a tough outer layer but in time this often exfoliates and weathers in a curious honeycomb manner. There are abundant fossils in this division the commonest being *Flabellipecten*, *Schizaster* and *Eupalagus*.

A ubiquitous phosphatic nodule bed, varying from a few inches to three feet in thickness, marks the upper limit of the division. Within the limestone there are other seams of phosphatic nodules of only local distribution. There are two such near Naxxar (4974) at 40 feet and 90 feet above the base. The upper phosphatic nodule bed (bed G of Cooke 1896, p. 503) yields abundant fossils including the teeth of a giant shark *Carcharodon megalodon* and of the seal *Phoca rugosidens* and also *Sterrodon*, *Notidanus* and *Odontaspis*. There are also corals, *Trochocyathus* spp., pectens and echinoids.

(ii) Middle Globigerina Limestone: The white marly limestones of this division which follow above the nodule bed at the top of the Lower Globigerina Limestone are everywhere readily distinguishable from the beds below in colour and lithology. The division is absent in eastern Gozo but increases to 150 feet near Rabat, Malta, and 390 feet in Marsaxlokk Bay (5965) where the series is very well exposed. Within this rather monotonous series several minor horizons of dispersed phosphatic nodules occur locally in west and central Malta. Also khaki-hearted cherts are developed in the lower portion and these form a prominent feature inland one mile south-west of Siggiewi, Malta (4967). A widespread phosphatic nodule bed marks the upper limit of this division and below this in western Gozo is a coarse yellow limestone unit.

The sparse fauna found within the Middle Globigerina Limestone includes the typical Langhian or Burdigalian nautiloid *Aturia aturi*. Also there are the echinoids *Brissopsis* and *Schizaster* and several pectens. Of particular interest are the remains of the turtle *Tryonx melitensis* and the crocodile *Tomistoma*.

(iii) Upper Globigerina Limestone: The upper nodule bed at the top of the Middle Globigerina Limestone is followed by a return to yellow and coarser beds similar in lithology to the Lower Globigerina Limestone. This division does not show the same pattern of thickness variation as the two lower divisions. Typically it is 70-80 feet thick but expands southwards and at Delimara Point in south Malta (6064) there is at least 140 feet.

This division can be farther divided in many places into three parts: a lower, yellow, fine grained limestone, a light blue marly and argillaceous division, and an upper, fine grained yellow limestone with common pteropod casts and honeycomb weathering. When well exposed, the junction with the Blue Clay above is 317 always clearly seen and it is difficult to understand why a contrary view is so widespread in the literature.

3. The Blue Clay

This formation, often called the 'Maltese Clays and Marls' or the 'Clays and Marls', lies conformably upon the Globigerina Limestone. It is a series of blue and yellow clays and marls, yielding selenite, up to 230 feet in thickness but at times thinning out completely. The clay is of considerable importance as a seal to the Upper Coralline Limestone and Greensand aquifer and has been used for pottery.

There has been considerable dispute as to the cause of the thinning of the Blue Clay. Murray and Cooke considered it was due to pressure of the Upper Coralline Limestone above leading to superficial 'bulging'. This is clearly a factor in most places, but in certain regions the Greensand and Upper Coralline Limestone may rest directly on the Middle and Lower Globigerina Limestone on a scale too vast to be interpreted as due either to 'bulging' or to removal by erosion of the intervening clay. In particular around San Anard (5970), two miles south-east of Valletta, the Upper Coralline Limestone transgresses northward over much of the Middle Globigerina Limestone and finally rests on the Lower Globigerina Limestone within half a mile.

Within the clay, rounded grains of quartz, augite, felspars and tourmaline have been recorded (Cooke 1893) and the fossils include pectens and *Aturia aturi*. These are of pelagic habit and similar to those typical of the true 'schlier' facies. 133

4. Greensand

The greensand is a coarse, orange-brown, thick bedded fragmental limestone which usually forms the base to the Upper Coralline Limestone cliffs. In the unweathered state an abundance of glauconite gives the rock a green colour. The thickness reaches a maximum of 50 feet in south-west Malta but it is usually about half this figure. In other places the formation is absent. The boundary with the Blue Clay below is very abrupt and, around the coasts, landslips commonly begin there. The upper boundary is often more difficult to define.

Frequently the rock is full of giant Foraminifera and has been termed a 'Heterostegina Rock' (Murray, 1890). Such developments are common on Gozo and near Dingli, Malta (4468). The formation has yielded a very rich echinoid fauna including *Clypeaster*, *Heteroclypeus* and *Echinolampas* together with shark teeth and the remains of dugongs, manatees, dolphins and whales.

5. Upper Coralline Limestone

This is the youngest Tertiary formation in the islands. Generally it caps the highest hills but, especially in northern Malta, faults bring it down to sea level. On Comino a thickness of some 250 feet is exposed and 530 feet was penetrated in a borehole near the centre of the Bingemma Syncline (4374) without reaching the bottom. Usually only about 100 feet is preserved on the high land. The rock varies considerably. Frequently it is composed of large growths of the coralline alga *Lithothamnium* with marly partings between the growths. In places it is a dense crystalline limestone and elsewhere there are thick marly seams rich in fossils. Compact limestone predominates, however, and it is usually poorly bedded. On Gozo the stone has been quarried as 'Gozo Marble' which is hard, red to yellow in colour and taking a good polish. Petrologically the formation is very similar to the Leithakalke of the Vienna Basin with which it has been correlated (Fuchs 1874). [316]

Fossils other than algae are locally abundant and they include the echinoids *Cidaris*, *Clypeaster*, *Schizaster*, *Echinus*, *Brissus* and *Echinolampas* together with abundant Foraminifera and large mollusca.

PLEISTOCENE AND RECENT DEPOSITS

These deposits may be conveniently divided into first, the valley loams and sands, second, the coastal conglomerates and breccias, third, the bone deposits in caves and fissures and finally the prehistoric remains.

The only widespread areas of valley deposits with stratified sands, loams and gravels of fluviatile origin are in the valley areas behind Mellieħa, St. Paul's, and Salina Bays.

Conglomerates and coastal breccias, often with Pleistocene Mollusca, occur in small patches around the Marfa Ridge, St. Paul's Bay, Mellieħa Bay, Għar Lapsi, Benġisa Point (5883) and St. Thomas Bay (6067). They usually form a moderately cemented rock composed of local material (Trechman 1936).

The Pleistocene ossiferous deposits, filling caves and fissures in the limestones, have yielded numerous interesting animal remains. The Għar Dalam Cave (5765) is the most celebrated but there are others at Qrendi, Żebbuġ, Mellieħa and Malak. The oldest faunas include Pleistocene dwarf hippopotomi, pygmy elephants, dormice and swans and a later deposit has horse and deer.

Stone Age remains include 15 temples, the best of which is perhaps Tarxien, Malta (5869) which has provided vessels and amulets as well as statuettes of grotesquely fat divinities (Zammit 1930), but others are very fine, especially Ħaġar Qim, Malta (4965) and Ġgantija, Gozo (3489). There is also a three-storied Hypogeum at Pawla. The complex system of cart tracks, with cross roads and junctions, are probably also of neolithic age. A detailed cultural sequence based on potsherds has recently been described by Evans (1954, 1959). 172

133 STRUCTURE

The Upper Coralline Limestone which crops out in eastern Gozo, Comino and in north and west Malta may be interpreted as marking the site of a much-faulted elongate basin, the axis of which strikes approximately N-S and which centres on Comino and north Malta. About four miles east of this line there is a disturbed anticlinal belt which runs from Salina Bay (4878) due south to Ghar Lapsi (4864) which is responsible, in part, for bringing the Lower Coralline Limestone to the surface around Mosta and Attard. Farther east the Globigerina Limestone forms a broad basin around Valletta and east-central Malta. In Gozo the faulted and gently folded strata rise towards the west and south-west.

The rocks on Malta are cut by a series of normal faults which cross the island in ENE to NE directions. Structurally Malta may be divided into two regions by the greatest of these, the Victoria Lines Fault, which downthrows north and passes from the west coast at Fomm ir-Rih (7340) to the east coast at Madalena Tower (5277). North of this fault are a series of rift and horst blocks which divide northern Malta into a series of valleys and ridges. South of the Victoria Lines Fault, the displacement on the faults is less conspicuous.

REGIONAL STRUCTURAL DESCRIPTION

It is convenient to describe the structure of Gozo first, then the northern half of Malta, and finally southern and central Malta.

1. Gozo

The island of Gozo is structurally a block tilted to the north-east so that along the northern coast between Ras ir-Reqqa (3193) and Dahlet Qorrot (3889) the top of the Lower Coralline Limestone is below sea level, whilst in the south-west, at Ben Gorġ (2788) and ta'Ċenċ (3286) it is around 400 feet above sea level. However, in the south and west this picture is disturbed by normal faults, fault complexes and flexures of some magnitude.

Over the northern half of the island the top of the Lower Coralline Limestone dips gently NE or NNE from about 200 feet above sea level at Rabat (3189) to 50 feet below sea level near Marsalforn (3392).

The southern part of the island, between Qala Dwejra (2789) and the North Comino Channel, shows more complicated structures. Here there are four structural downwarps around Qala Dwejra, Xlendi Bay, Mġarr ix-Xini and Ghajnsielem, and complex faulting is associated with these. The Dwejra region (2789) forms a peculiar structural and topographical basin, almost a mile across and opening westward, in the centre of which the top of the Lower Coralline Limestone is brought near to sea level whilst at St. Lawrenz and Ben Gorġ, one mile to the north-east and south respectively, it is at least 300 feet above sea level. In the centre of the downwarp are several circular or semicircular faults, the fault planes of which are clearly visible as walls around small amphitheatres about 350 yards across. These are probably collapse structures, but their origin is obscure. Through the region pass several east-west faults, one of which, with a downthrow to the north, continues to Rabat.

Around Xlendi Bay (2987) there is another structural downwarp accompanied by complex faulting. The major fault runs north-east up the Wied ix-Xlendi and subsidiary faults join it especially from the north where it is linked with the Qala Dwejra-Rabat Fault. Dips in towards the valley are high, reaching 28°SW. The structural low brings the top of the Lower Coralline Limestone to less than 50 feet above sea level, whereas near Ben Gorġ to the west (2788), it is at 400 feet and along the cliffs near ta'Ċenċ to the ESE (3286) it reaches over 450 feet above sea level, the highest structural elevation on the Maltese Islands.

The valleys around Mġarr ix-Xini (3486) mark the site of a tectonic depression and fault complex. The two largest faults on Gozo pass out from this centre, one, to the WNW, reaches to Sannat and downthrows over 200 feet north, the other passes north-west to near Ghajnsielem and on to Qala. Connected structurally with this complex is a syncline which passes northwards towards Xewkija where it links with the Xlendi Bay complex by the Xlendi Bay-Xewkija Fault. This syncline is cut by several faults downthrowing south.

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The ix-Xini - Għajnsielem - Qala Fault, which reaches a maximum throw of about 400 feet south of Nadur (3688), tectonically separates south-eastern Gozo from the rest of the island. Between Għajnsielem (3587) and Qala (3887) Upper Coralline Limestone on the southern, downthrown side successively abuts beds between the Lower Coralline Limestone and the Blue Clay. Other minor faults, mainly striking NNE, E or SE proceeding westwards, cut the various formations which crop out along the coast.

2. Northern Malta

Northern Malta is dominated structurally by large normal faults striking ENE which divide the region into horst and rift blocks which are reflected topographically in ridges and valleys. The main units from north to south are, the Marfa Ridge, Mellieħa Isthmus, Mellieħa Ridge, Miżieb Valley, Bajda Ridge, Wied tal-Pwales, and the Wardija Ridge which passes south into lower land around Bingemma. The Għallis region (4978) forms a separate shallow dome to the south-east. This area is bounded to the south by the cliff-like face of the important Victoria Lines Fault between Fomm ir-Riħ and Madalena Tower. With the exception of the Għallis region, where Lower Coralline Limestone and Globigerina Limestone have wide outcrops, the Upper Coralline Limestone has the largest outcrop and older formations are seen mainly around the coast.

The Upper Coralline Limestone of the Marfa Ridge dips north and is truncated to the south by a major fault, downthrowing at least 350 feet south, which introduces the Mellieħa rift valley. The southern fault of the Mellieħa Valley must exceed 200 feet in throw. Several other minor faults affect both the valley and the ridge and they strike FSF or FNE. There are also a few minor dip faults.

The Mellieħa Ridge varies in width from one mile in the east to half a mile in the west. A narrow fault belt, about 500 yards in maximum width, forms a southern boundary to the ridge and the downthrown Upper Coralline Limestone to the south underlies the Miżieb valley and gradually rises to the south to form the Bajda Ridge. The southern side of this ridge is limited by an important fault, downthrowing south, which passes from near the Naval Rifle Range (4077) to Rixawn Point (4578).

Wied tal-Pwales is a narrow rift only half a mile in maximum width, the southern boundary of which is marked by steep slopes along the line of a fault downthrowing over 200 feet north which passes NNE from Għajn Tuffieħa Bay (4076).

The country for two miles to the south is cut by several faults, mostly trending ENE, NE or E, but none are of great throw. The Upper Coralline Limestone here is gently folded, especially in the south against the Victoria Lines Fault where, at Bingemma (4374), an asymmetric syncline runs parallel with the fault.

The shallow dome around Għallis to the east shows only minor faulting. Some of the faults strike ENE, others NE.

The Victoria Lines Fault, downthrowing north between 300 and 600 feet gives rise to a fault scarp which is perhaps the most striking single topographic feature of the islands. The fault strikes ENE and in the west it almost brings the Upper Coralline Limestone down to the north against Lower Coralline Limestone. The throw in general decreases to the east and near Madalena Tower (5276) the Lower and Middle Globigerina Limestone is downthrown north against low levels in the Lower Coralline Limestone.

3. Central and Southern Malta

South of the Victoria Lines Fault numerous faults cross the country striking NE, but they do not form a dominant topographical control as they do to the north. Here the most important structures are large-scale gentle folds.

An anticlinal belt consisting of three main upwarps crosses central Malta from north to south between Mosta (4873) and Għar Lapsi (4864). To the west, a broad structural low centres beneath some of the highest ground. To the east, the broad, rolling Globigerina Limestone country forms a wide basin around

133 Valletta which gives way, in the extreme south-east, to southerly dips. The only important dislocation is the Malak Fault at Ghar Lapsi which strikes NW and downthrows south-west at least 800 feet.

The westerly structural low brings the top of the Lower Coralline Limestone less than 100 feet above sea level between Qlejgha (4072) and Baħrija (4171). But the region is very much complicated by shallow folds and faults. There is a general structural rise to the south-east, however, and this culminates near ta'Zuta (4566) where the top of the Lower Coralline Limestone is over 300 feet above sea level.

The main north-south anticlinal belt through central Malta was first recognised by Sir Edward Bailey. It is not, however, a simple ridge but forms several upwarps. The main domes are around Naxxar (4974), near Zebbug (4970) and north-east of Ghar Lapsi (4865). The first and last of these domes brings the top of the Globigerina Limestone over 400 feet above sea level.

The broad Valletta basin which centres on the Grand Harbour must carry the top of the Lower Coralline Limestone a few hundred feet below sea level. To the north the structures rise to give the outcrops of Lower Coralline Limestone north of Sliema (5574) and to the west they rise towards the central anticlinal belt. To the south-west the rise culminates near Żurrieq (5265) and to the south, after rising to give the Lower Coralline Limestone inliers near Żabbar (5870) and Kospikwa (5771) the strata dip regularly to the south-east. Younger and younger strata are therefore regularly exposed in that direction and the highest beds, the Upper Globigerina Limestone, crop out on the peninsula of Delimara Point (6064).

The Malak Fault at Ghar Lapsi (4864) downthrows the Upper Coralline Limestone at least 800 feet to seaward. The fault strikes NW and forms a conjugate association with the more usual NE or ENE striking faults. The fault plane is well exposed, and dips steeply seaward. The fault between Ta Berwiek (4864) and Deub il-Bagdal (4964) is double, enclosing a thick sliver of Globigerina Limestone.

The Age of the Faulting

The faults of the islands form prominent scarp faces and in many cases the actual fault planes show up as walls marked with original slickensiding. This suggests that the faulting must be quite recent. Indeed, Pleistocene Mollusca have been recorded in a crushed conglomerate caught up in the Malak Fault. [172] The neolithic cart tracks which enter the sea at St. George's Bay, Birzebbuga and other places show that there has been even more recent movement of the islands.

114 This account is based in part upon a field survey of Malta and Gozo carried out at the expense of British Petroleum Company Ltd., in March-April, 1955. The geologists engaged in the work, in addition to the authors, were Dr. M. H. P. Bott and Dr. A. A. Wilson, also of the Durham Colleges' Geology Department. The authors acknowledge their indebtedness to the Directors of the Company for permission to publish this summary. In addition visits were made in 1958 and 1960.

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B. RELIEF AND LANDFORMS

133 The Maltese Islands, though they cover an area of only 120 square miles and reach a maximum height of little more than 800 feet, show great diversity of relief and landform. Thus detailed description and study involve the identification of a large number of regional divisions. The brief account which follows seeks to describe and analyse relief and landforms, and makes no attempt at full explanation of their origin and development since no detailed geomorphological work has yet been carried out in the islands. Furthermore, it has been found necessary to omit all mention of a large number of minor relief features which, though apparently insignificant when seen on the map, have had a decisive effect on the human occupation of the land, as will be shown in the sequel.

Briefly, the physical landscape of the Maltese Islands may be said to be composed of the following major elements:-

1. Coralline Limestone plateaus, which form the highest areas and are bounded by well-marked escarpments. These uplands range in size from the massive triangular plateau of western Malta to the tiny pinnacles of north-western Gozo.
2. Blue Clay slopes which separate the plateau uplands from the surrounding areas and which also occur in valleys cut into the plateau edges.
3. *Rdum* or 'undercliff' areas, occurring where the coralline plateaus meet the sea.
4. Flat-floored basins which in most cases are the result of faulting (e.g. Wied tal-Pwales) or downwarping (e.g. Binġemma Basin) but which are sometimes due to erosion and subsequent alluvial deposition (e.g. Wied il-Għasel).
5. Globigerina hills and plains - large areas of gently sloping land which, in Malta, take the form of a series of low ridges and shallow valleys but which, in Gozo, have a more varied though none-the-less subdued topography.

MALTA (Fig. 3)

The main island falls readily into two parts along the Victoria Lines fault, this major structural feature being marked by a well-defined escarpment which runs along the whole breadth of the island from Ras ir-Raheb (3973) to the coast (5277) north-east of Għargħur. The height of the escarpment decreases towards the east where, however, it becomes more abrupt. The Naxxar-Għargħur hills (xvii) are separated from the Wied il-Għasel (ix) lowlands by a precipitous drop of 150 feet, while in the west, the slopes down to the Binġemma Basin (xi) are appreciably gentler. The scarp face is broken by a series of deep embayments, of which the Wied tal-Baħria (4073), the Santi (4272) and Binġemma (4372) gaps in the west, the Wied ta'l-Isperanza (4875) in the centre and the Wied Anġlu (5076) and Wied id-Dis (5176) in the east are the most prominent. Only one of these, the Wied ta'l-Isperanza, makes a complete break through the Victoria Lines, and that an extremely narrow one. (Plate I.)

In the area south of the Victoria Lines, the major topographic divisions are clearly marked. To the west, the Coralline Limestone plateaus stand at heights of 600 to 800 feet and give way eastward through an irregular escarpment to the undulating areas developed on the less resistant Globigerina Limestone and lying for the most part below 400 feet. The western plateaus (xiii and xiv) are fretted on all sides by deeply incised valleys which have cut back into the upland to give it an extremely irregular outline. The south-western edge has been least affected by such action, and the regular line of cliffs are broken only in one place, where the wied complex of l-Imtahleb (4270) forms a deep embayment. Beneath the seaward edges of the plateaus lie the *Rdum* lands.

On the east is a series of valleys carved by streams descending to the central plains. From north to south, these are the Wieds il-Hemsija (4571), tal-Merħliet (4670), ta'l-Isqof (4669), il-Luq (4668), ix-Xagħri (4667) and Girgenti (4667). These valleys form deep depressions, their floors lying some 200 feet below the plateau spurs which separate them, spur and valley floor being connected by sweeping slopes developed on the Blue Clay. (Plate II.)

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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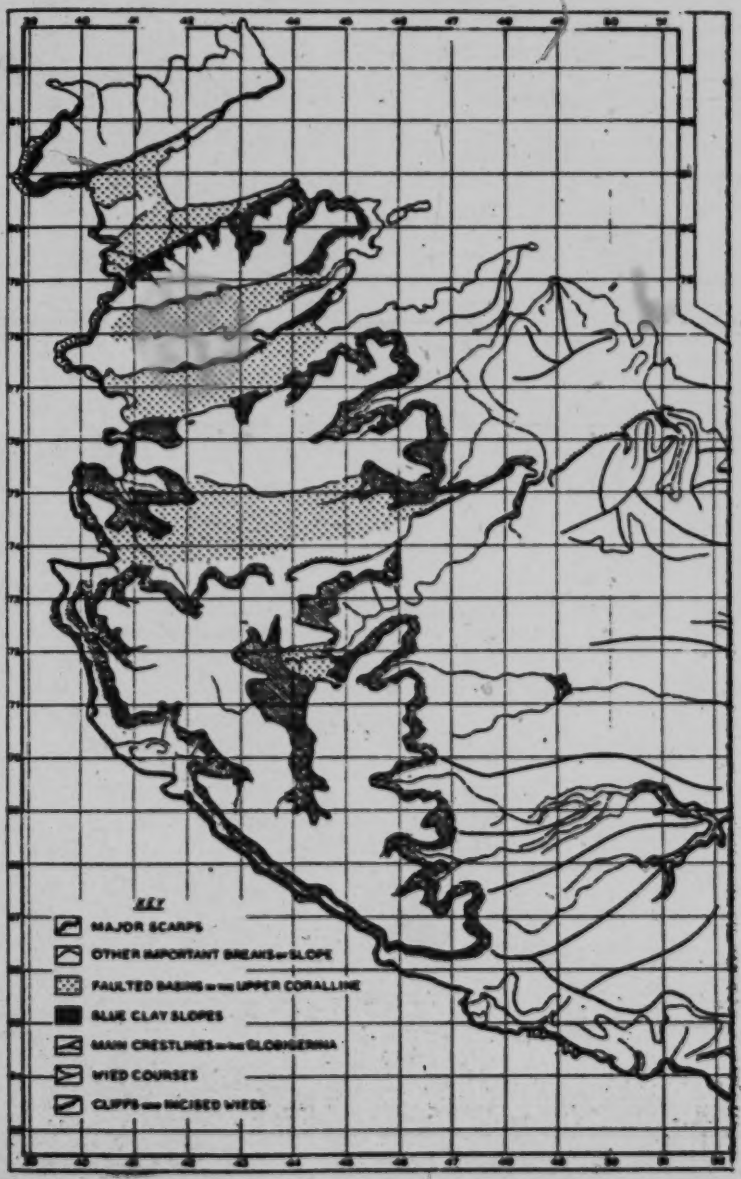

[p. 35-A]

Fig. 3 Physiography of Malta

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Fig. 3

[p. 35-B]

Physiography of Malta.

133 The plateau itself is divided into two parts, the Santi-Binġemma (xiii) and Rabat-Dingli (xiv) Uplands, by the Blue Clay Basin (xv), an interior depression drained by the upper Wied Qlejgħa and its tributaries Wieds Għomor (4372), Għemieri (4371), il-Busbies (4371) and l-Iemu (4470) which converge towards the narrow outlet north-east of Fiddien Bridge (4471). The undulating, rocky surface of the plateau contrasts vividly with the valley and basin lands which surround and penetrate it, not only in landform, but also in the character of the human imprint.

The Naxxar-Għargħur Hills (xvii), though forming part of the Globigerina Limestone area of Malta, are sufficiently distinctive to warrant their inclusion as a major sub-division of the island. From their smooth and rounded summits at heights of 400 to 450 feet, the land falls away in convex slopes eastwards and southwards to the coast and to the Lija-Msida valley respectively. Several small valleys cut sharply into the surface but these are a good deal narrower than those of the Coralline plateaus described above.

The Central (xviii) Southern (xix) and Eastern (xx) regions are for the most part areas of gentle relief (Plate III), but even here the terrain is by no means featureless, and steep slopes occur in a number of places. West of a line running in the general direction Pawla (5569)-Luqa-Mqabba-Qrendi (5165), a series of ridges and valleys leave the Coralline plateaus of the west and the hill lands of the south to converge towards Marsamxett and Grand Harbour. Thus the Naxxar-Għargħur Hills are succeeded southwards by the Lija-Msida Valley which in turn gives way to the low upswelling of the Attard-Hamrun Ridge. This in turn falls away to the open valley of the Wied is-Sewda, bounded on the south by the Żebbuġ (4969) Ridge. Beyond this are the Wieds il-Beqqiegħa and il-Ħesri, the Siġġiewi Ridge and the Wied Silani. In their upper courses, the three last-named valleys form gentle depressions rather than well marked troughs, but where they converge in the Wied il-Kbir complex (5269) they are sharply incised to depths of 100 feet or more below the general level before they open out again in the alluvial Marsa lowland (5470). The southern edge of this region falls to the the sea in a line of cliffs only slightly less impressive than those further west (Plate IV). While the cliffs themselves are rarely more than 100 feet in height they are backed by steep slopes rising to a crest line which runs parallel to and less than a mile from the coast. The height of this crest-line declines eastwards from a maximum of 450 feet to about 150 feet south of Kalafrana.

East of the Pawla-Qrendi line mentioned above, the general relief trend is from east to west. Ridges running from Ricasoli (5772) to Żonqor (6169), from Żabbar (5870) to il-Bidni (6069) and from Żejtun (5868) to il-Għira (6168) are separated by the Wied il-Għajn and ta'Mazza depressions, these features all converging towards Marsaskala Bay (6169). Further south, the convergence of ridges and valleys is towards Marsaxlokk. This arrangement gives an undulating character to the area, and steep slopes are confined to the coasts of Żonqor and Delimara and the Wieds Ħas-Saptan and Dalam. The latter are both incised into the Lower Coralline Limestone.

Thus the landscape of the Globigerina areas is one of low ridges and valleys, and level land is very limited in extent, occurring only around the head of Marsa Creek and in the ta'Qali and Luqa (5268) airfield districts.

NORTHERN MALTA

The area north of the Victoria Lines fault is the most accidented section of the island, containing both the steepest slopes and largest expanses of flat or near-level land in Malta. Here, a major subdivision occurs along an irregular line running from St. Paul's Bay (4678) to Mosta (4874), which separates a western zone, where the Coralline cap rock has been preserved almost intact, from a smaller eastern area from which it has been entirely removed.

The eastern area falls into two sections of roughly equal size. The low upswellings of the Għallis Hills (x) and the Qawra Peninsula (viii), though their summits stand at less than 200 feet above sea level, are clearly defined topographic features, quite distinct from the broad, flat-floored, alluvial lowland of the Wied il-Għasel and its tributary the Wied ta'Għajn Rihana (ix). The latter

[see page 46—Analyst]

[Text continues on page 38]

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Plate 1. Wied ta l'Isperanza. North of Mosta the valley cuts through the Lower Coralline fault-scarp of the Victoria Lines.

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Plate II. Western edge of Upper Coralline Plateau. Spring. Foreground: ramped fields on Blue Clay slopes. Middle distance: Girgenti orchards and gardens. Background: Upper Coralline karst.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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133 region stretches nearly two miles inland from Salina Bay (4878) and lies for the most part at heights below 50 feet, being abruptly terminated at its southern end by the escarpment of the Victoria Lines Fault.

The remainder of northern Malta consists of a series of fault-guided blocks and basins which, by comparison with the rest of the island give this region an almost mountainous appearance. From north to south, the major divisions are: the Marfa Peninsula (i), Mellieħa Isthmus (ii), Mellieħa Ridge (iii), Miżieb Depression (iv), Bajda Ridge (v), Wied tal-Pwales (vi), Wardija Upland (vii) and Bingemma Basin (xi) (Plate V), important local features are, however, ignored in this simple statement.

The Marfa Peninsula (i), which reaches a maximum height of 400 feet in the west, has its steepest slope on the southern side where it overlooks the Mellieħa Isthmus and Mellieħa Bay in an abrupt fault-line scarp, the height of which decreases from 400 feet in the west to a little over 100 at the eastern extremity. The slope northwards to the Comino Channel (il-Fliegu ta'Malta) is a gentle one, diversified by numerous small valleys.

The Mellieħa Isthmus (ii) is a compound feature in which northern and southern alluvial depressions - il-Ghadira and il-Hofra respectively - are separated by a low upswelling of Coralline Limestone which reaches a summit level of 200 feet near Ras in-Niexfa (4079).

The Mellieħa Ridge (iii) has been tilted from north to south so that its major escarpment, in which the Blue Clay outcrops, faces north over the isthmus and is breached by a series of narrow steep-sided valleys (Ġnejn Ingraw (4279), Wied Mellieħa, Wied Għajn Żejtuna (4370)) which form deep embayments in the scarp face. The ridge itself is a limestone plateau with a summit level of 400-450 feet declining eastwards to 300 feet or less in the Selmun - tal-Blata (4580) district.

The southern slope of the Mellieħa Ridge, though less abrupt than that on the north, is still well-marked and there is a drop of 200 feet in less than 300 yards to the Miżieb depression (iv). The latter is a narrow plain some 600 yards across and two and a quarter miles long with its lowest point about 100 feet above sea level. It narrows to the east and gives way to the Wied tal-Mistra (4478) where headward erosion from the Qala Mistra (4579) has exposed the Globigerina and Blue Clay and produced a valley whose floor lies less than 50 feet above the sea over a distance of one and a half miles.

The Miżieb depression is synclinal in structure and the southern limb of the syncline forms the gentler, northern side of the Bajda Ridge (v). The latter is another Coralline Limestone upland, but stands at heights (200-250 feet) a good deal lower than those already described.

A minor escarpment 50 to 100 feet high separates Bajda from the Wied tal-Pwales (vi), a flat-floored depression about half a mile wide which runs right across the island from Għajn Tuffieħa (4076) to St. Paul's Bay (4478). The highest point in this area is only about 75 feet above sea level and the greater part of the region is below 50 feet. With the exception of the Wied il-Għasel, this is the largest area of true lowland in the island. There is a marked contrast in landform between the northern and southern borders of this lowland. While the former is a minor escarpment rising directly to a limestone upland, the slopes of the southern sides are longer and less steep, passing through a zone in which patches of Blue Clay occur before attaining the summit of the Wardija Uplands.

The Wardija Uplands (vii), whose summits lie between 400 and 450 feet above sea level are the largest area of limestone plateau north of the Victoria lines and are more complex in detail than those already described. They are tilted from north to south so that their northern face is fretted by a series of north-flowing valleys but they have also been vigorously dissected along their eastern edge where the Wied Qannotta drainage system extends nearly to the Saliba crossroads (4476) and divides the eastern part of the uplands into northern and southern sections.

The dip slope of the Wardija Uplands leads south to the Bingemma Basin (xi), a flat-floored depression at heights of 250 to 275 feet. This region gives way eastwards through a well-marked break of slope (4875), to the upper Wied

[Text continues on page 39-B]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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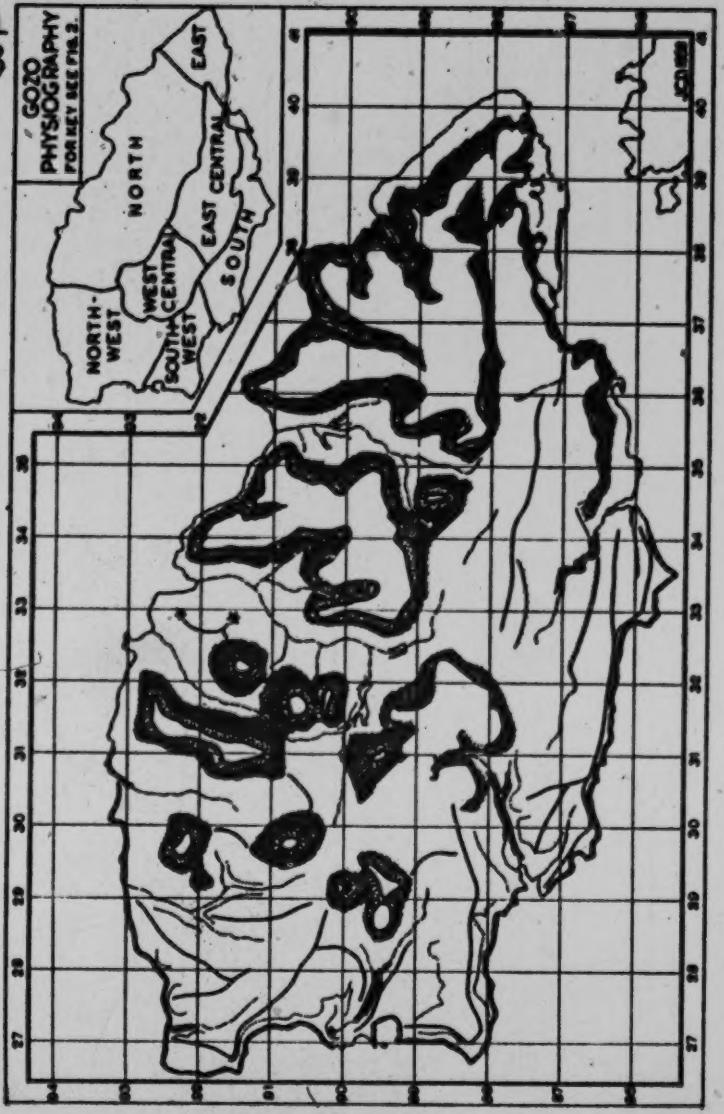

Fig. 4 Physiography of Gozo.

[p. 39-A]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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ta'Ghajn Rihana which is, in fact, incised into the basin floor. The basin is in turn flanked on its southern side, by the long slopes, developed on Globigerina Limestone and Blue Clay, which lead up, through a vertical distance of some 500 feet, to the Victoria Lines. 133

The Gnejna district (4175) requires separate mention since it forms an outlier of the Western *Rdum* ('Undercliff') Lands (xii), the main body of which lies south of the Victoria Lines on the seaward side of the Coralline plateaus. In Gnejna, vigorous erosion by two streams has exposed the Globigerina and Blue Clay to give a deep embayment in the Coralline edge comparable in landform to the Imtahleb embayment mentioned above.

GOZO (Fig. 4)

Though covering little more than one-third of the area of the main island, Gozo is topographically more varied than Malta. Two main features dominate the landscape: the fragmented plateau of Upper Coralline Limestone and the more low-lying plains and hills developed on the Globigerina. Between the two are sweeping slopes which mark the outcrop of the Blue Clay (Plate VD.

In the northern half of the island, erosion has broken the Coralline plateau into a series of disconnected fragments which diminish in size, but increase in height from east to west. The largest of these, the Nadur (3688) and Xaghra (3389) uplands, each cover an area of more than two square miles and rise to heights of 400-450 feet, thus occupying the bulk of the north-eastern part of the island. These uplands, like their counterparts in Malta, are penetrated by numerous sharply-incised valleys whose slopes and floors alike are developed on the Blue Clay. These include the Wieds Dahlet Qorrot (3889), tal-Mistra (3790) and San Blas (3790) and the eastern tributaries of the Wied ir-Ramla in the case of the Nadur plateau, while the Xaghra plateau is cut into by the Wied tal-Pergla and the eastern tributaries of the Wied ta'Marsalforn. Where these two uplands reach the coast, *Rdum* or 'undercliff' areas occur, Blue Clay slopes descending steeply to the sea from beneath the bluffs which mark the edge of the limestone

[p. 39-B]

133 outcrop. In the far north-east, however, between Dahlet Qorrot and Ras il-Qala (4087), the slope down to the sea is a good deal less steep and a rocky platform occurs where the Lower Coralline appears in a narrow belt along the coast.

The Wied ir-Ramla, which separates the Nadur and Xagħra Uplands, is a wide, open valley, whose gently-sloping floor contrasts with the steeper slopes which mark its upper edge and with the narrow enclosed valleys mentioned above. This valley carries northward, albeit at a lower level, the Globigerina plains of central Gozo and the same may be said of the still larger Wied ta'Marsalforn, which separates the part of the island so far described from very different areas to the west.

West of the Wied ta'Marsalforn, small and scattered fragments are all that remain of the Upper Coralline plateau. The north-western part of Gozo is essentially an undulating plain of Globigerina limestone into which the valleys are for the most part not at all sharply cut and above which clay slopes lead up to the numerous mesas. These, though small in surface area, are an impressive feature of the landscape, standing as they do 150 feet or more above the level of the surrounding plains. The largest plateau is that on which Żebbug (3191) stands and this is only about one mile long and 400 yards across at its widest point. The Żebbug upland stands more than 500 feet above sea level and is bounded on the east by the Wied tal-Qlejgħa and on the west by the Wied il-Għasri, the two largest valleys of the north-western region.

A line of hills, culminating in heights of over 500 feet in the Coralline summits of tad-Dabrani (3291), ta'Kuljat (3190) and il-Harrax (3190), separates the Wied Qlejgħa from the Wied ta'Marsalforn. Minor summits in il-Qolla s-Safra (205 feet/3392) and il-Mirbuq (330 feet/3291) represent minute fragments of similar origin.

West and north of a line Żebbuġ-Kerċem (3088) - Ras id-Dwejra (2790), the Globigerina plains rise slowly to heights of 300-375 feet along the western coast where cliffs descend to the sea in a sheer drop of nearly 300 feet. In this region, too, numerous mesas such as Ġordan (2992) and Għar Ilma (2989) occur, all standing more than 500 feet above sea level. The valleys of the Wied il-Għasri (3092), Wied il-Mielaħ (2992) and Wied ir-Raheb (2792) are broad, open and gently-sloping save in their lower courses where, over short distances, they have exposed and cut into the Lower Coralline.

In the Qawra (2790) - id-Dwejra - Wied Ilma (2889) area, complex faulting has led to the formation of a deep trough which separates north-western Gozo from the hill-lands of the south-west. The latter reach a maximum height of 528 feet near Ras il-Wardija (2688) and fall away eastwards to the outskirts of Kerċem where they stand at 350 feet. Markedly assymetrical in form, the Wardija hills slope gently north to the Wied Ilma but are bounded on their southern side by precipitous cliffs which in places are as much as 400 feet in height. Further east, this southern edge turns inland to overlook the narrow, fault-bounded trough of the Wied ix-Xlendi (2987).

The southern coastal area between the last-named valley and the Wied Mġarr ix-Xini (3486) is a second region in which uplands, in this case rising a little above 450 feet, are bounded on the south by a line of cliffs and fall away in gentle slopes northwards to the central plains. East of Sannat (3137), however, the ta'Ċenċ upland (3286) overlooks the central plains in a well-marked fault-line scarp some 50 feet high, along which a narrow outcrop of the Lower Coralline occurs.

East of Mġarr ix-Xini, a change takes place in the character of the southern coast. Inland, faulting has preserved a large area of Upper Coralline from beneath which the Blue Clay outcrops to form the seaward slopes. Thus Rdum it-Tafal (3686), Wied tal-Mġarr (3687) and tax-Żewwieqa (3787) are similar in character to the coastlands of the north-east.

Near and to the east of Qala (3888), a southward extension of the Nadur plateau is flanked on its southern side by a fault-shattered zone in which the detailed arrangement of landforms is extremely complex. Blue Clay valleys, of which the Wied tal-Qala (3887) is the largest, run south to the coast and are separated by promontories and lines of cliffs.

The areas so far described enclose the central region of Gozo. This area, though by no means devoid of variety, is the least accidented part of the island.

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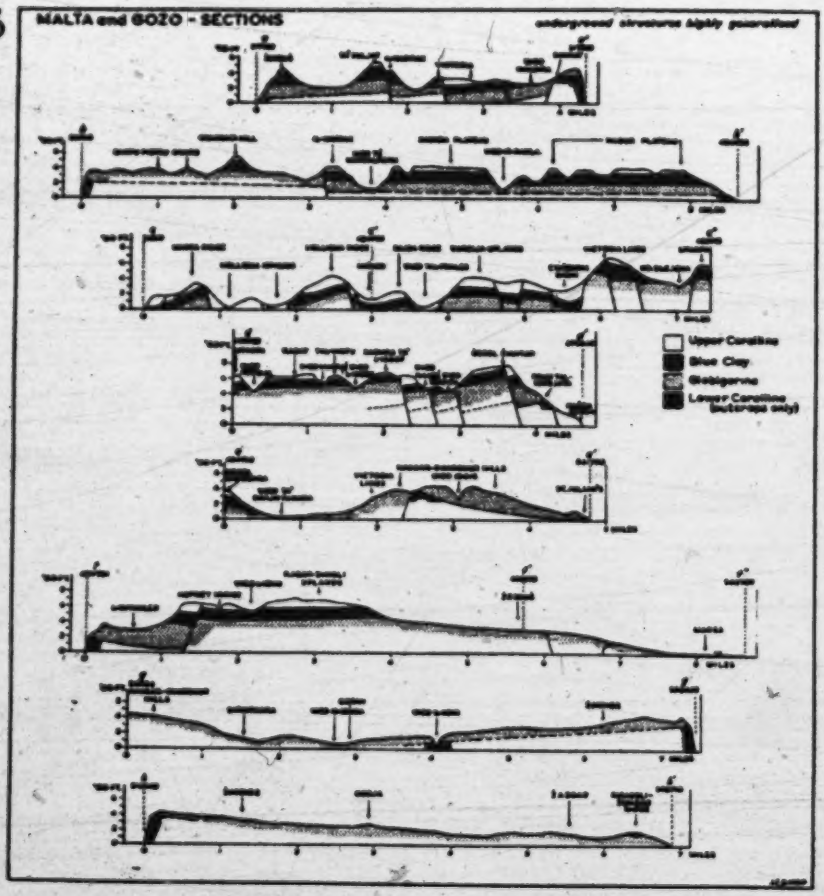

Fig. 5 Sections, Malta and Gozo.

West of Rabat, il-Gelmus (479 feet/3189) separates the Żebbuġ-Rabat basin, drained by the upper reaches of the Wied ta'Marsalforn, from the San Ġorġ basin (3089), whose outlet is via the Wied tal-Lunzjata (3188), to the Wied ix-Xlendi. These basins, whose lowest points are at 250 and 175 feet respectively, rise gently to low cols on which stand the villages of Għasri (3090) and Santa Luċija (3989). Rabat itself is sited on a low elevation of Upper Coralline, flanked on its eastern side by a minor escarpment beneath which unusually gentle clay slopes occur.

The area between Rabat and Għajnsielem (3687) is an undulating district lying at heights between 375 and 350 feet. The Xewkija (3387)-Għajnsielem Ridge, which is fault-bounded on its southerly, steeper side, is a recognisable topographic feature, though it rises but little above the general level of the area. The ridge is flanked on either side by plains of which the one to the north is

133 the most uniform. To the south, the slight incision of the Wied Hanħira (3387) gives somewhat steeper slopes, though here again relief is very subdued. No topographic break occurs where, to the east, faulting has preserved the Upper Coralline, and the central plains continue unchanged across the structural boundary until they fall away to the Wied Biljan (3787) and the Wied tal-Mġarr which run down to Mġarr Bay.

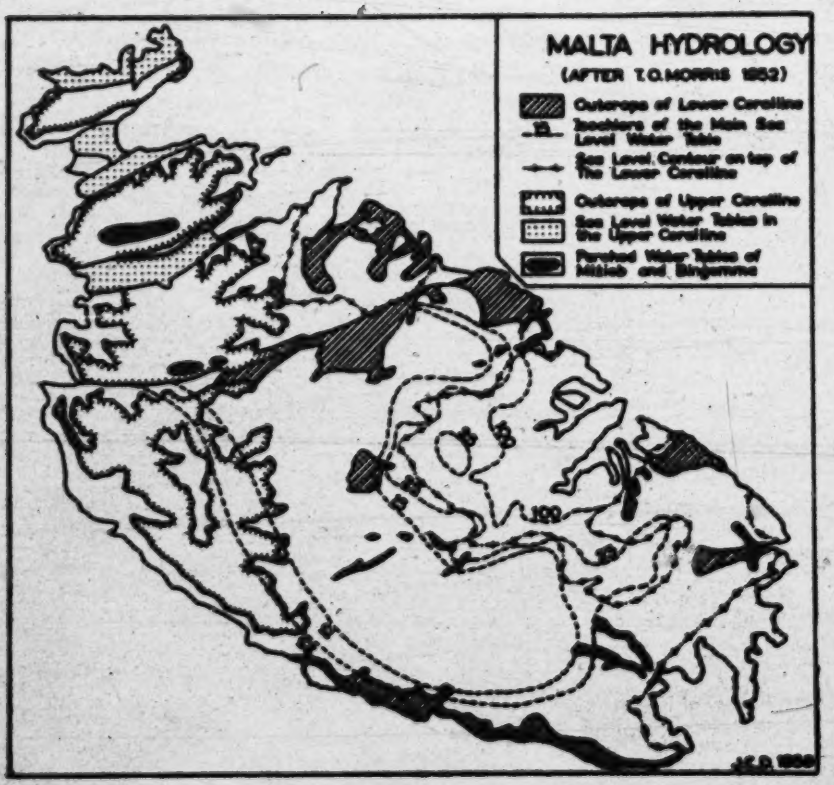

Fig. 6 Hydrology of Malta.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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C. HYDROLOGY AND WATER SUPPLY

An adequate water supply being essential to all forms of economic activity, industrial as well as agricultural, it is not surprising that a great deal of attention has been paid to this topic in Malta where, as in so many regions of Mediterranean climate, a limited and erratic rainfall makes water supply a perennial problem. This has become increasingly serious and difficult of solution during the period of British rule. Rapid growth of population and a rising standard of living have been accompanied by increasing water consumption per head as well as overall. A long series of reports of varying worth and conflicting conclusions has appeared during the last 50 years of which the Morris Report (1) published in 1952, is the most recent and most authoritative. This work is of interest not only for its thorough treatment of modern conditions but also for its critical appraisal of earlier published work. It forms the basis of current policy in the field of water supply development. [114]

Climate in general and precipitation in particular are more fully dealt with elsewhere (Chapter II, p.48). Suffice it to say at this point that the heavy, often very localised downpours accompanied by rapid run-off, in which the bulk of the rainfall occurs, together with summer drought and intensive evaporation, are factors which greatly reduce the value of a by no means abundant precipitation.

Malta is fortunate in its stratigraphy (see Chapter I A, p.25) which provides particularly favourable conditions for the percolation and underground storage of rainwater. The most valuable aquifers are the Upper and Lower Coralline Limestones where, however, the presence of bedding planes, joints and fissures is of far more importance in controlling the underground movement of water than are the porosity and permeability of the rocks themselves. The Globigerina, though it contains important limestones, is composed largely of thick and relatively impervious marly beds, through which percolation is slow and from which run-off is correspondingly rapid.

Two distinct water tables (2) exist, one in the Upper Coralline and the other in the Lower Coralline and Globigerina formations. There is a further subdivision into water tables based on sea level and those developed above impermeable strata. Physical conditions and the history of development of the two sources are so distinct as to warrant their separate treatment at this stage. The Main Sea Level Water Table (or the Lower Water Table) so named to distinguish it from smaller sea level tables occurring in the Upper Coralline, has for the past hundred years been the main source of the public supply in Malta and now accounts for some 90 per cent, or more the water extracted by the Water Department. This water table 'is in bodily continuity with water of Mediterranean salinity marginally and at depth... It is not retained within the island by any impermeable base, but owes its existence to the simple fact that every winter the local rainfall adds more fresh water to the underground store than can be dissipated by (i) the direct discharge of its superficial portion around the coast in response to the head of water inland and (ii) the deterioration of its composition ... as the result of diffusion from the highly saline Mediterranean water around it and beneath it' (3).

The area occupied by this water table is bounded by (a) the coast where the Lower Coralline outcrops and (b) the line along which the junction of the Lower Coralline with the Globigerina lies at sea level (Fig. 6). The area thus defined occupies 37.5 square miles south of the Victoria Lines and 4.3 to the north, the most valuable parts being those where the salinity of the top water does not exceed 15 parts per 100,000. Such conditions are limited to an area of 22.8 square miles. The water body is replenished for the most part through the extremely limited outcrops of Lower Coralline since the Globigerina, especially where it is soil covered, forms a region of very slow percolation. Thus it is of particular importance that the Lower Coralline catchments should be preserved and protected from pollution. Such areas are rarely cultivated but it is unfortunate, though not unnatural, that they are often used for other purposes, in many

cases being built over (e.g. the Incita Asylum, the Government Poultry Farm, St. Andrew's Barracks, etc.) and in others being used as refuse dumps (e.g. parts of the Wieds Qirda and Has-Saptan). The small section of the Lower Water Table which lies to the north of the Victoria Lines in the Wied il-Ghasel district is very limited in value. Deep fissures result in the mixing of salt water with fresh and development beyond that already undertaken privately is most unlikely to occur.

The Upper Water Table has been broken into a series of blocks by faulting and the Upper Coralline Limestone aquifers, in which water movement is controlled mainly by fissures, are often thin, so that storage possibilities are limited. However, there is considerable scope for further development. Upper Coralline sea-level water tables occur in Marfa, the Mellieha Isthmus and Wied tal-Pwales, but these are already used to such an extent for agricultural purposes that salinity has become a serious problem (see Chapter VIII, pp. 240 and 243). It is the high-standing water tables, sealed off by the Blue Clay beneath, which are the most important though hitherto largely neglected sources, particularly in the Mizieb and Bingemma Basins, where perched synclines collect water from the neighbouring uplands.

Replenishment of the Upper Water Table, like that of the lower, depends largely on the character of the surface and it is here that a conflict of needs becomes apparent. Expansion of the rural population over the past hundred years has been accompanied in many districts by expansion of both soil cover and building on the Upper Coralline. The former reduces percolation and creates a bigger demand for irrigation water. Several areas in which over-pumping for agricultural purposes occurs have been noted during the present survey, e.g. the Rabat-Dingli Plateau. The growth of settlement inevitably increases both water consumption and pollution. As Morris points out, there is 'a clash of interests between the local agricultural communities and the much more numerous... urban section of the population' (4). To suggest, however, that 'any further expansion (of soil cover) over the upland catchment areas should be prohibited' (5) appears unrealistic and favours the urban element at the expense of the cultivator. The towns must first make their contribution by restricting consumption which has recently increased at an unnecessarily rapid rate. Prohibition of building on Upper Coralline areas might, with more justice, be enforced.

PRESENT UTILISATION OF WATER SUPPLIES: That urgent action is required, not only to increase production from the Upper Water Table but also to regulate consumption is readily apparent, for extraction has now risen above the rate of replenishment in the Main Sea Level Table. Morris, writing in 1952, suggested that a total extraction rate per annum of 2,500 million gallons with an average salinity not exceeding 28 parts per 100,000 could be achieved. Of this, however, 1,500 million gallons with a salinity of 12 or less should come from the Upper Coralline, while 1,000 million gallons *only* would come from the Lower Water Table, even if the acceptable limit of salinity was to be set at 50 parts per 100,000. In fact, rapidly increasing consumption has already brought the total of extraction by the Water Department to a level very little below the suggested maximum and over 90 per cent. comes from the Main Sea Level Table. The amount of water drawn from this source has increased from 1,460 million gallons in the year 1945-46 to 2,106 million gallons in 1955-56, that is by over 40 per cent. in ten years. During the same period, the total consumption of piped water has risen by a similar proportion although the population has increased by only 4 per cent. Average salinity of water drawn from the Lower Table has fluctuated considerably during this period with an overall tendency to rise. The maximum recorded was 93.7/100,000 in 1947-48. The scale of longer term change is illustrated by a salinity figure in the region of 20 for the year 1900. Average salinity is in any case a somewhat artificial concept since the chloride content of the water varies both regionally and from one season to another. Regional variations in the average salinity are illustrated in Fig. 6 and are extremely important in their effects on agriculture. Seasonal variations are equally great

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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and indicate the deterioration of the piped water supply. In order to keep up with the demand it has been necessary on occasions to pump water with a salinity as high as 245/100,000 (6). 312

Attention has been drawn on many occasions to the dangerous combination of increasing consumption and the associated rise in salinity. The point is most strongly made by Morris: 'The Main Sea Level Water Table is being grossly over-pumped. In a few years' time no water fit for human consumption will remain unless the present rate of extraction is reduced drastically' (7). This warning has been reiterated in the annual reports of the Water Department. A good deal is being done to implement suggestions for the development of the Upper Table, particularly at Mizieb, but also in the Binġemma Basin. As yet, however, there has been no reduction whatsoever in the rate of extraction from the Lower and, since Malta will necessarily depend primarily on the latter source for many years to come, rigid control of all uses, domestic, industrial and agricultural, must be maintained. Restrictions on consumption must be applied as a matter of principle and not confined to years of below-average rainfall when the problem is more readily apparent. An unsatisfactory attitude is, for example, illustrated in the Water Board Report for 1953-54 when a winter of plentiful precipitation was followed by a summer which 'went by without the usual economy campaign for saving water and without subjecting the consumer to drastic restrictions'. In fairness to the Board it should be pointed out that the Report made it clear that 'this might be construed to mean that the water situation... is no longer critical. Nothing could be further from the truth. The higher consumption... has had to be painfully met at the cost of higher salinity ... the present rate of over-pumping is suicidal' (8). However, sustained action rather than exhortation is required.

IRRIGATION: The foregoing paragraphs have been confined almost entirely to a consideration of the piped water supplies to towns and villages, a subject on which much information is readily available. Of greater relevance to the present study, however, are the demands of irrigation which, in one form or another, is carried on wherever conditions permit. Though sample studies have been made from time to time, there is as yet no really complete information on the amount of water used in this way but the quantity applied to the land is believed to be little less than that passing into the piped supply.

A few general remarks are appropriate at this stage. In the first place, though published agricultural data give figures for the areas of 'irrigated' and 'dry' land, it is by no means easy to draw a clear dividing line between the two, nor is it certain that the farmers' returns are exact on this point. Water is applied to the land in many ways. At the 'drier end of the scale' are the many areas in which crops are hand watered from cisterns cut into the rock. At least 10,000 of these are erroneously marked as 'wells' on the larger-scale maps and many more have no doubt been omitted. They are largely confined to the Globigerina lands. Secondly, innumerable pumps of various kinds; wind-, motor- and donkey-powered, tap all water tables. In some cases they are used to fill rock-cut or concrete tanks from which water is carried to the fields; in others, the tanks feed into stone channels or temporary earthen ditches. Wind-pumps are particularly important on the Upper Coralline plateaus, in many parts of which they have been sunk in excessive numbers thus lowering the level of water table. They are less numerous, though by no means unimportant in the Sea Level Water Tables whether these be developed in downfaulted Upper Coralline or in Lower Coralline and Globigerina. Here, pumping has often led to rapid increases in salinity and some such cases are commented upon in Chapter 8. Finally, the areas in which water is most plentiful are those fed from spring lines occurring where the Blue Clay outcrops from beneath the Upper Coralline Limestone.

It is believed that at least 3,000 million gallons a year are used for irrigation purposes. Various sample data are available to illustrate the scale of agricultural water consumption. An official survey of private wells in Malta is now under way and by March 1956, 2,012 of these had been recorded (9). 2,200 tapped the Upper Water Table and drew 360,882 gallons in the year 1955-56.

[Text continues on page 47]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Plate III. The Central Plains. Summer.
Foreground: summer vegetable cultivation. Middle distance: carob trees on valley side.
Background: Wied is-Sewda and Qormi village.

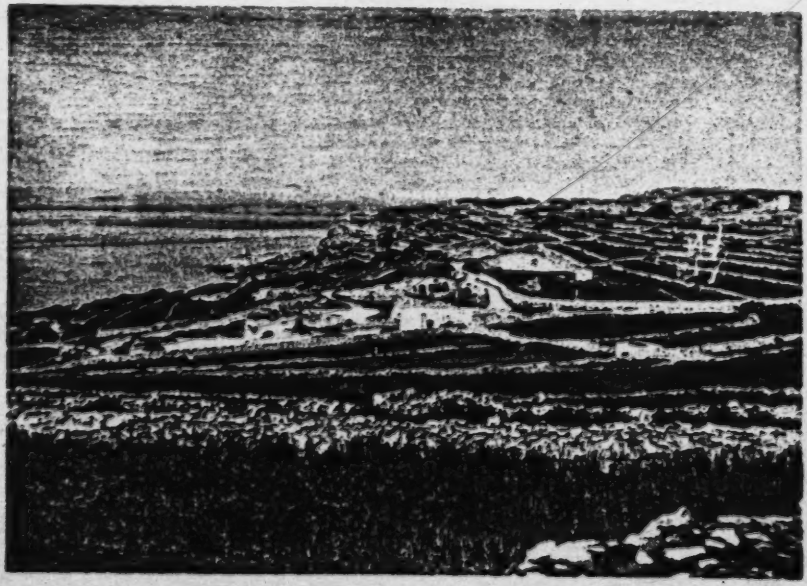

Plate IV. Cliffs south of Zurrieq. Spring. Narrow, terraced fields.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

A further 285 in the Main Sea Level Water Table produced 606,329 gallons, while 407 in the depressed parts of the Upper Coralline yielded 409,881 gallons, a total of 1,376,762 gallons from less than 3,000 pumped wells. The problem of salinity in sea-level water tables is illustrated by the Wied tal-Pwales where in 1945 private wells yielded water with a salinity ranging from 22 to 142/100,000 while in 1953 the corresponding figures were 25 and 200/100,000 (10). 312

Finally, an accurate check has been kept on water obtained from those springs on the Rabat-Dingli Plateau which feed aqueducts for town supply. Over a period of years these have yielded an average of 251 million gallons annually, equivalent to 26.7 per cent. of the supply provided by an average yearly rainfall of 20.51 inches on a catchment area of 3.16 square miles (11).

A survey carried out by J. Baldacchino in 1942-45 provides some data on the amount of water used to irrigate various crops (12). There can be little doubt that much water is wastefully applied. The highest rate of application was that to summer ma[illegible]ws which received 30 waterings, 210,000 gallons per tomna, the equivalent of 33 inches of rain. The most striking fact, however, concerned the spring potato crop which took 15 waterings, 90,000 gallons per tomna, equivalent to 15 inches of rain. This was water applied from January to April, some of the wettest months of the year, and is perhaps an adequate comment on the suitability or otherwise of this crop to Maltese conditions - a question raised elsewhere in the present volume. Careless storage and prodigal application of water under conditions of intense isolation and evaporation indicate an uneconomic use of a limited resource.

Irrigation and the piped supply thus appear to make approximately equal demands on water resources - now, a probable 2,000 million gallons in the case of the former and a more certain 2,415 million gallons in the latter. This total of over 4,400 million gallons consumed annually may be compared with an annual supply from rainfall of 27,550 million gallons (assuming an average precipitation of 20 inches over an area of 95 square miles). What is not known is how much of this latter total percolates to the water tables and how much is lost at various stages of the water cycle by direct run-off, evaporation, transpiration and seepage into the Mediterranean. Some of the answers will be provided by the evapotranspirometer stations recently established in Malta.

Gozo has not thus far been mentioned and relatively little hydrological investigation has been carried out there. The general arrangement of water tables irrigation practice, etc., are little different in principle from those described for Malta. The lower population density, the absence of a large urban element and the generally lower standard of living in the material sense make the problem a good deal less acute. Consumption per head from the public supply is approximately half that of Malta. 184 312

There is in the Maltese Islands, and particularly in Malta itself, conflict between urban and rural uses of water just as there is in the use of labour, land and capital. When the resource is already limited as it is in the case of water, the conflict becomes more apparent and its resolution depends on economic as much as on purely physical factors. Water shortage is a background against which all plans for future development, including the industrial, must be viewed. 312 369

REFERENCES

(1) MORRIS, T. O.: The Water Supply Resources of Malta. Govt. Printing Office, Valletta, 1952. 113
(2) By common usage in Malta, the term 'water table' is applied to the whole body of water contained within the aquifer and not, as elsewhere, to its upper surface alone.
(3) MORRIS, op cit., para. 153, p. 62.
(4) Ibid., para. 225, p. 109.
(5) Ibid.
(6) Report on the Working of the Water and Electricity Department for the Year 1952-53; Govt. Printing Office, Valletta, 1954. Para. 11.
(7) MORRIS, op cit., footnote to table 15.
(8) Report on the Working of the Water and Electricity Department for the Year 1953-54; Govt. Printing Office, Valletta, 1955. Para. 2.
(9) Report...etc., for the Year 1955-56. Appendix IV.
(10) Report...etc., for the Year 1952-53. Appendix IV.
(11) MORRIS, op cit. Table 8.
(12) Ibid. Table 14.

Chapter II

THE MALTESE CLIMATE AND WEATHER

*132 That the climatic regime of the Maltese Islands is of a Mediterranean type is self-evident, but the simple picture of hot, dry summers alternating with mild, wet winters requires a great deal of elaboration before a full idea may be obtained of the range of conditions encountered in the Islands. As in all Mediterranean areas, mean monthly figures for rainfall, temperature and the other climatic elements mask important variations of three kinds: daily fluctuations, contrasts between one year and another, and regional differences, these last being important despite the small surface area involved. Daily, seasonal and annual fluctuations are clearly illustrated by the data for any one station and, in this chapter, the rainfall readings for Valletta from 1841 to 1957, together with Agius's means(1) for other climatic elements measured at Valletta are used. These sources are, as explained below, the fullest records available and cover periods of sufficient length to include all the extremes which are likely to occur. Regional variations are less easy to describe, in that data for stations outside Valletta is fragmentary and in many cases of dubious accuracy. This chapter includes an analysis and bibliography of the available climatic records, particularly in the case of rainfall, and an attempt has been made to assess the range of conditions in space as well as in time.

Table 1. Rainfall. The monthly means for Valletta are as follows:

	S	O	N	D	J	F	M	A	M	J	J	A	Yr.
Inches	1.12	3.11	3.56	3.83	3.49	2.16	1.64	0.93	0.42	0.09	0.04	0.17	20.54

The Mediterranean characteristics are clearly seen in these figures with nearly 70 per cent. of the rain falling in the six months October-March inclusive with a particularly well-marked concentration (c. 50 per cent.) in November, December and January. Equally obvious is the extremely dry summer season, June, July and August having only 1.5 per cent. of the total.

The possible range of rainfall conditions is, however, more clearly illustrated by the rainfall frequency diagram (Fig. 7), which shows the extent of variations from the mean during the past century (to conform with common Maltese practice, a rainfall year beginning on 1st September and ending on 31st August has been used in preference to the calendar year). In the case of the annual total, for example, the amount recorded has ranged between a maximum of 39.36 inches, nearly twice the average, in 1858-59, to a minimum of 7.95 inches, only 40 per cent. of the average, in 1845-46. The inter-quartile range, within which 50 per cent. of the readings lie, is from 24.36 inches to 17.21 inches, a relatively small divergence of about 15 per cent. on either side of the mean, but it is the exceptional years of excessive wetness or abnormal drought which most affect such things as water supply and farming, that make dangerous any reliance on average or so-called 'normal' conditions. During the 116 years from 1841-2 to 1956-57, annual amounts have been distributed as follows:-

Total Annual Rainfall	Number of Occurrences
Less than 10 inches	4
10-14 inches	9
15-19 inches	43
20-24 inches	35
25-29 inches	20
30-34 inches	3
35-40 inches	3

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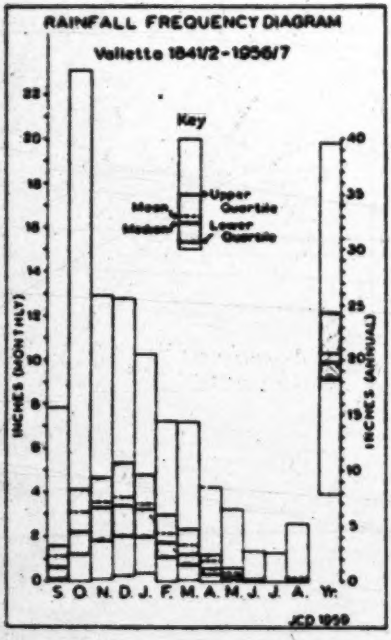

Fig. 7 Rainfall Frequency, Valletta, 1841/2 - 1956/7.

When the individual months are examined, it is seen that only four, November, December, January and March, have not, on at least one occasion, been months of complete drought and even these four have recorded minimum totals of only a fraction of an inch. It will further be observed that variations from the mean are greatest in the wetter, winter months, the period when rainfall amount is of vital importance to all the major cultivated crops. Lack of space prohibits a detailed discussion of each month in turn, but October may be taken as the extreme of variability. The greatest quantity of rain which fell in any October between 1841 and 1956 was the phenomenal total of 23.08 inches recorded in 1951, when nearly 60 per cent. of the total for that climatic year fell in this month alone, and when the October rainfall was actually 12 per cent. greater than the annual average! The smallest amount ever recorded for October was zero in 1843 and again in 1859 giving a total range of 23.08 inches between the highest and lowest figures. In 50 per cent. of the years 1841-1956, rainfall was between 1.17 inches and 4.15 inches, an inter-quartile range of 2.98 inches. While the average or *mean* precipitation for this month was 3.11 inches, the *median* was only 2.31 inches, the former being raised above the latter by a small number of very high readings like that of 1951. The wettest month, on the average, is December, but there have been many occasions on which this has not been the case, as the detailed graphs (Fig. 8) indicate. The driest month is July, where absolute drought has occurred in 97 of the last 116 years. Thus the percentile range is low: nevertheless 1.38 inches fell in July 1873. Finally, the point should be made that 'dry' or 'wet' years are not necessarily years of low or high rainfall throughout every month. Thus 1955-56, with a total of 18.15

[Text continues on page 48]

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Fig. 8A Valletta, Daily Readings of Temperature, Rainfall, Wind Direction and Relative Humidity, 1954-55.

Fig. 8B Valletta, Daily Readings of Temperature, Rainfall, Wind Direction and Relative Humidity, 1955-56.

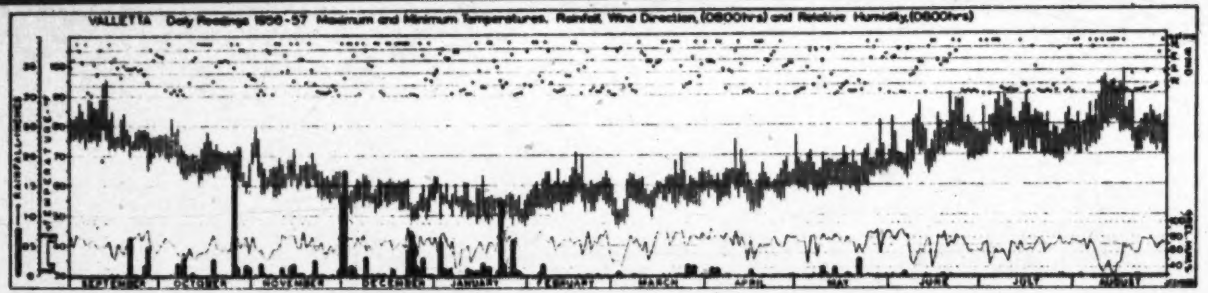

Fig. 8C Valletta, Daily Readings of Temperature, Rainfall, Wind Direction and Relative Humidity, 1956-57.

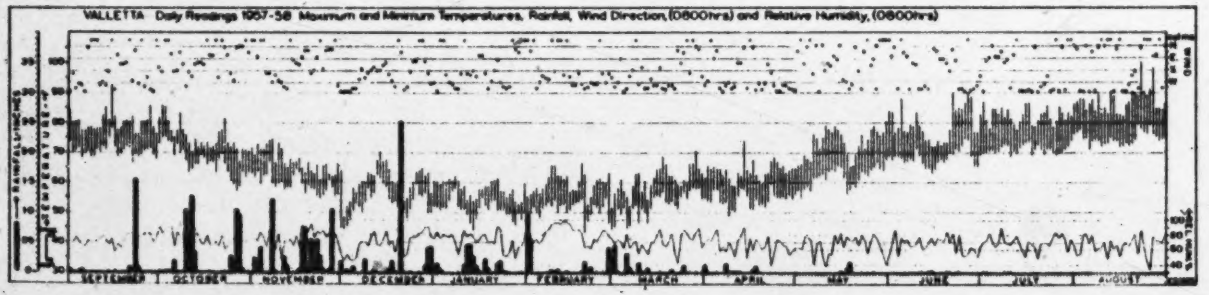

Fig. 8D Valletta, Daily Readings of Temperature, Rainfall, Wind Direction and Relative Humidity, 1957-58.

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*132 inches, contained a September in which rainfall was three times the average for that month (see below). Conversely, in the wettest recorded year, 1858-59 with 39.36 inches, September, October and November all had totals well below their mean amounts. In short, the averages, annual and monthly alike, bear little relation to the conditions which may be experienced in any particular year.

RAIN DAYS: The occasional high intensity of rainfall, torrential storms being accompanied by rapid run-off which reduces the effectiveness of the precipitation, is another important feature of the Maltese climate elaborated below. Daily falls of two or three inches, representing 10 per cent, or more of the annual total, are by no means uncommon and much larger amounts have often been recorded. It is on these occasions of heavy storms that regional variations in rainfall are most marked. Days with rain average 77 or nearly one in five, the monthly distribution being as follows:-

Table 2.	S	O	N	D	J	F	M	A	M	J	J	A	Yr.
Rain days	3	7	11	14	13	10	8	5	3	1	0.2	0.7	77

The number of rain days in any particular month varies greatly from year to year and the relationship between the number of days with rain and the total fall is by no means direct. For example:-

TABLE 3. A comparison of rain-days and monthly totals.

	DECEMBER		FEBRUARY		APRIL	
	Rain days	Total fall	Rain days	Total fall	Rain days	Total fall
1954-55	12	2.64"	4	0.38"	10	3.16"
1955-56	8	1.68"	17	3.87"	0	0.0"
1956-57	19	6.14"	4	0.25"	5	0.41"
1957-58	13	4.38"	9	2.28"	6	0.40"
Long-term means	14	3.83"	10	2.16"	5	0.93"

TEMPERATURE: Air temperature conditions are extremely stable with an annual mean of 64°F. and monthly means ranging from 53°F. to 77°F. Variations from these means, though important, are far less striking than those outlined above for rainfall:-

TABLE 4. Temperatures.

°F.	S	O	N	D	J	F	M	A	M	J	J	A
Mean	74	69	62	56	53	53	55	59	64	71	77	77
Mean max.	81	76	68	62	59	60	62	66	71	79	84	85
Mean min.	71	66	59	54	51	51	52	56	61	67	72	73
Absolute max.	100	94	82	75	76	76	83	93	89	99	105	105
Absolute min.	57	45	42	39	39	34	37	44	49	58	62	62

There is no real thermal dormant season, and air temperatures are such as to permit the cultivation of a wide range of crops. Occasionally, however, plant growth is checked by abnormally low winter minima and high spring and summer maxima increase water requirements. Air frost is unknown, but northerly winds

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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in January and February sometimes cause '*ġlata*', the freezing of dew on plants, while there is some evidence to suggest that true ground frosts occur on a few nights in most years. Despite the small area of the Islands, distance from the sea has some effect: inland stations record maxima some five or six degrees higher and minima a similar amount lower than those of Valletta. 132*

WIND: The Maltese climate is characterised by the strength and frequency of its winds. The percentage of days with calms reaches a minimum of seven in April and a maximum of only 14 in August. Over the year as a whole, only one day in ten records no measurable air movement. By far the most common wind at all seasons is the cool north-westerly *Majjistral* which blows on 29 per cent. of the days of an average year. This is followed in importance by the dry north-easterly *Grigal* (15 per cent.) and the hot, humid *Xlokk* (13 per cent.). Wind direction naturally has a considerable effect on air temperature. The greatest extremes of cold and heat are associated with the northerly *Tramuntana* and the southerly *Nofsinhar* respectively, while the prevailing north-westerlies keep summer maxima down but give unpleasantly bleak conditions in the winter months.

RELATIVE HUMIDITY is consistently high, rarely falling below 40 per cent, and being for the most part in the range 65-80 per cent. Monthly means indicate the relatively small differences between summer and winter conditions in this respect. Recorded extremes range from 99 per cent. (13th February, 1958) to 28 per cent. (14th August, 1957).

TABLE 5.	S	O	N	D	J	F	M	A	M	J	J	A	Yr.
Relative humidity %	71	73	75	76	77	77	75	75	73	70	66	68	73

Humidity is generally a good deal higher than in neighbouring Mediterranean coastlands and the combination of high temperatures with high humidity in the summer months is a noteworthy feature of the Maltese climate.

TABLE 6. Temperature and Humidity at Valletta and Syracuse.

		Jan.	July	Year
Mean temperature	Valletta °F.	53	77	64
"	Syracuse °F.	51	78	64
Mean relative humidity	Valletta %	77	66	73
"	Syracuse %	69	62	68

Combinations of wind, temperature, and humidity conditions often have an adverse effect on plant growth which is not suggested by a consideration of any one of these elements in isolation. The *Xlokk*, *Majjistral* and *Grigal* affect transpiration rates and wilting points to a considerable degree.
1954-58 (TABLE 7): A particularly close study has been made of day-to-day weather conditions during the years in which the authors have been working in the Maltese Islands. Monthly means of temperature and rainfall are tabulated below and daily rainfall, maximum and minimum temperatures, wind direction and relative humidity have been graphed in Fig. 8. The latter illustrates the considerable variations experienced even within the short period of four years.

CLIMATIC YEAR 1954-55: In this year, the onset of the autumn rains was late, the first fall occurring on 25th September and the total for that month being well below the mean. The dry spell was accompanied by temperatures above and relative humidity below average. Winds show no dominant direction and this month was characterised by an abnormally large number of calm days (37 per cent.). Similar conditions continued into the first week of October, but were followed by some ten days of heavy rain brought by predominantly westerly

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TABLE 7. Climatic Data for the Years 1954-58.

Valletta, Lat. 35° 54' N., Long. 14° 31' E., Ht. 185 feet.

	S	O	N	D	J	F	M	A	M	J	J	A	Yr.
						Rainfall (inches)							
1954-55	0.27	5.89	4.48	2.64	2.40	0.38	3.06	3.16	0.04	-	0.06	1.64	24.03
1955-56	3.06	2.88	1.40	1.68	3.95	3.87	2.35	-	0.06	-	-	-	18.15
1956-57	1.28	3.17	1.20	6.14	3.85	0.25	0.46	0.41	0.64	0.07	-	-	17.47
1957-58	1.77	5.97	6.36	4.38	2.29	2.28	1.48	6.40	0.49	0.04	-	-	25.48
Long-term means	1.12	3.11	3.56	3.83	3.49	2.16	1.64	0.93	0.42	0.09	0.04	0.17	20.54
						Rain Days (number)							
1954-55	4	7	18	12	15	4	14	10	2	-	1	3	90
1955-56	11	15	12	8	13	17	10	-	3	-	-	-	89
1956-57	4	9	15	19	19	4	5	5	6	2	-	-	88
1957-58	5	11	18	13	14	8	10	6	3	1	-	-	90
Long-term means	3	7	11	14	13	10	8	5	3	1	0.3	0.7	77
						Mean Temperatures (°F.)							
1954-55	76.2	66.9	61.8	57.7	58.2	58.7	57.8	58.7	67.6	74.2	79.8	78.4	
1955-56	74.6	67.4	63.1	58.3	56.9	51.9	54.6	60.1	64.9	71.3	78.3	78.3	
1956-57	77.2	68.2	62.5	55.4	54.2	56.8	56.6	60.3	64.4	73.6	77.0	77.0	
1957-58	75.1	70.5	63.4	56.5	53.9	54.9	56.6	59.0	68.1	73.9	76.7	81.2	
Long-term means	74	69	62	56	53	53	55	59	64	71	77	77	
						Mean Maximum Temperatures (°F.)							
1954-55	82.4	71.8	66.0	61.6	61.9	63.9	62.9	62.7	73.1	79.5	87.0	83.2	
1955-56	79.7	73.0	68.0	64.1	61.2	55.6	59.0	65.2	69.5	77.1	84.9	86.5	
1956-57	82.3	73.0	67.4	59.8	57.7	62.3	61.2	64.6	69.7	79.7	83.3	86.3	
1957-58	80.4	75.6	67.7	60.7	58.2	60.0	61.0	64.0	73.1	77.0	82.3	87.0	
Long-term means	81	76	68	62	59	60	62	66	71	79	84	85	
						Mean Minimum Temperatures (°F.)							
1954-55	71.3	62.9	58.0	54.8	55.5	54.6	53.3	54.1	62.6	68.9	73.8	73.6	
1955-56	70.1	64.6	59.5	51.5	53.8	50.8	50.8	55.5	60.3	67.5	72.3	74.0	
1956-57	72.9	64.2	59.1	52.2	53.4	52.9	52.7	56.1	59.7	68.4	71.4	74.2	
1957-58	70.4	66.9	59.9	53.0	50.6	51.0	52.2	54.1	61.3	67.6	71.8	74.6	
Long-term means	71	66	59	54	51	51	52	56	61	67	72	73	
						Absolute Maximum Temperatures (°F.)							
1954-55	91.0	77.1	75.4	67.7	66.8	74.1	80.4	66.3	94.6	86.1	103.2	91.0	
1955-56	91.8	79.9	78.8	73.3	69.4	67.4	64.8	74.9	83.2	89.6	104.6	96.0	
1956-57	95.3	82.7	79.6	64.1	63.4	71.3	70.8	75.2	81.4	90.3	90.6	97.7	
1957-58	92.8	86.0	74.9	70.2	62.6	67.0	70.8	74.0	80.2	90.0	87.1	100.1	
Long-term maximum	100	94	82	75	76	73	83	93	95	99	109	105	
						Absolute Minimum Temperatures (°F.)							
1954-55	67.9	58.0	49.0	49.5	49.5	46.8	46.3	48.9	56.0	65.0	69.2	68.4	
1955-56	62.6	58.4	48.0	51.6	45.4	37.1	42.0	45.0	55.0	61.0	66.0	67.0	
1956-57	65.0	57.5	54.4	45.8	46.1	48.3	48.3	50.3	55.9	62.0	67.0	69.8	
1957-58	66.4	57.0	54.8	44.5	44.0	43.4	44.5	48.8	54.8	63.0	68.7	71.0	
Long-term minimum	57	45	42	39	39	36	37	44	49	58	63	63	

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winds and the month had rainfall markedly above and temperatures well below the means. November, similarly, was a good deal wetter than usual, while the third week was marked by abnormally low temperatures and low humidity accompanying a persistent north-westerly air-stream. December, January and February, particularly the last, provide a contrast with the two preceding months in that their rainfall was considerably below average. Temperatures were remarkably stable during these three months, rarely rising above 65°F. and falling below 50°F. on only six occasions. An abnormally dry, warm February was followed by a period of heavy rain in the first half of March, appreciable falls occurring on 12 of the first 16 days of that month. This wet period was also one of low temperatures, daily maxima being appreciably below those experienced in the preceding three months while the lowest daily minima of the year also occurred in this period. The second half of March, on the other hand, was unusually hot and dry, the last week recording maxima in the range 75-80°F. and relative humidity falling as low as 40 per cent. The absolute maximum of 80.4°F. was one of the highest ever recorded in March. April, by contrast, recorded more than three times the mean rainfall for that month and was, in fact, slightly wetter than March. May, June and July were months of almost complete drought, though a single fall of 0.06 inches on the 9th July raised the total for that month 60 per cent. above the average. Temperatures mounted steadily, reaching their maximum in the third week of July, but late July and early August were marked by a sharp fall in both maxima and minima. A slight recovery in mid-August was followed by a period of rather cool conditions during which rain fell on three days to a total of 1.64 inches, nearly ten times the average for the month.

1954-55 may thus be said to have had a wet, cool autumn, a mild, rather dry winter, an unusually wet spring, and a summer rather cooler and less dry than usual. Total rainfall for the year lay near the upper limit of the inter-quartile range and nearly 20 per cent. above the mean.

CLIMATIC YEAR 1955-56: The damp autumn presaged by the rain of late August was realised in an abnormally wet and stormy September whose rainfall was nearly four times the average and whose temperatures were appreciably below 'normal'. A fall of 1.75 inches on the 13th represented more than the mean for the month. October recorded near-average rainfall and temperatures but November and December were unusually dry, mild and calm. Much the same may be said of the greater part of January, but particularly heavy rainfall on the 6th, brought the total close to the monthly mean. February was both cold and wet. With 17 rain-days, a total fall of 3.87 inches and a minimum temperature of 37.1°F., these conditions again being associated with persistent west and north-west winds, February 1956, and particularly its first half, represents the extreme of bleakness, at least during the four years under review. A similar, though slightly less intense bleakness characterised the middle part of March and provides a striking contrast with the same period in the preceding year. From 25th March until the end of the climatic year (31st August), an abnormally long period of drought occurred, broken only by three small falls of rains during May. Temperatures rose to an extreme maximum of 104.6°F. towards the end of July, when a minimum relative humidity of 37 per cent. was also recorded.

The pattern for 1955-56 was thus one in which a cool, wet autumn was followed by a cold, wet winter and early spring and a particularly hot, dry summer.

CLIMATIC YEAR 1956-57: Drought and high temperatures continued until 21st September, but four wet days in the last ten gave a monthly total rainfall rather above the mean. An average October and a rather dry November were followed by a particularly wet December when a total fall of 6.14 inches was one of the highest recorded in the period under review. Temperatures, however, did not fall appreciably below the mean, though a minimum of 45.8°F. was recorded. January was a little wetter but slightly milder than usual, the absolute minimum being 46.1°F. By the end of January, 15.64 inches of rain had fallen (since 1st

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*132 September) and only another 1.83 inches fell in the remaining seven months of the climatic year. This prolonged drought, during which rain fell on only 22 days (approximately one in ten) and during which the heaviest fall was 0.28 inches on 22nd May, is by far the most remarkable feature of this year and, indeed, of the whole four-year period. As mentioned elsewhere, the exceptionally dry late winter and spring was a particularly serious matter for the agriculturist. There was little of note concerning the run of temperatures during this dry period and these are clearly illustrated by the graph. However, the generally rather low relative humidity of the summer months with a minimum of 28 per cent. on 14th August is worthy of note.

In 1956-57, a fairly 'normal' autumn and winter, though with a few periods of particularly heavy rain, were followed by a strikingly 'abnormal' spring and summer, the low rainfall of these seasons bringing the annual total well below the mean, and almost to the lower limit of the inter-quartile range.

CLIMATIC YEAR 1957-58: As the diagram shows, the first part of this year was abnormally wet with a particularly large number of days of heavy rain. 18.5 inches fell in the four months September-December inclusive and considerably higher totals were recorded at stations other than Valletta (see below). The period from January to August, however, was one in which monthly rainfall totals were near or rather below average, so that the annual total was not as high as might have been expected. Nevertheless, at 25.48 inches, the latter was 25 per cent. above the mean and lay outside the inter-quartile range. The heavy rainfall of autumn 1957 was as noteworthy as the drought which preceded it and had an adverse effect on farming operations by delaying the planting of many of the winter crops. The only feature of note concerning the temperatures of this year was their 'normal' character, no monthly mean diverging from the average by more than 2°F.

The four years studied in detail thus give a fairly full picture of the range of conditions likely to be experienced in Malta over a much longer period and contain examples of practically all recorded extremes of temperature, rainfall and humidity conditions.

RAINFALL IN THE MALTESE ISLANDS

Under the climatic conditions prevailing in the Islands, rainfall is undoubtedly the most important of the climatic elements and its distribution in space and time are of vital importance to the people of Malta in general and to the agricultural community in particular. Detailed studies, first of the provenance and quality of recorded data, and secondly of periodic rainfall totals have been made by P. K. Mitchell and have appeared in reports submitted to the Colonial Office (2). Here it is necessary to restrict examination to certain aspects of particular value and interest.

Publication of daily rainfall totals, based on measurements in a 'pluviometer' in Valletta, began in 1841. There are now 40 meteorological stations in the Islands. Here we summarise in list form the main developments of the last century and consider qualitatively the information derived from observations made at the stations shown on Fig. 9.

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CHRONOLOGICAL LIST OF OBSERVATIONS, MANUSCRIPTS and PUBLISHED DATA (Fig. 10)

A. 1841-42, at Military Hospital, Valletta, and from 1843-55 on the University Roof, also in Valletta. The mss. are lost, but monthly data were published by Delicata, 1856 (3). Used later by Chadwick (4), and in Blue Books 1880 and 1881 (5).

B. 1841-46, at an unknown site in Valletta. The mss. are lost but incomplete publication of daily records appeared in *Portafoglio Maltese*, 1841-47.

C. 1843-47, yet another gauge in Valletta, probably in Strait Street. Mss. lost. Incomplete and inaccurate publication of monthly data in *Societa Medica* (6), n.d.

[Text continues on p. 58]

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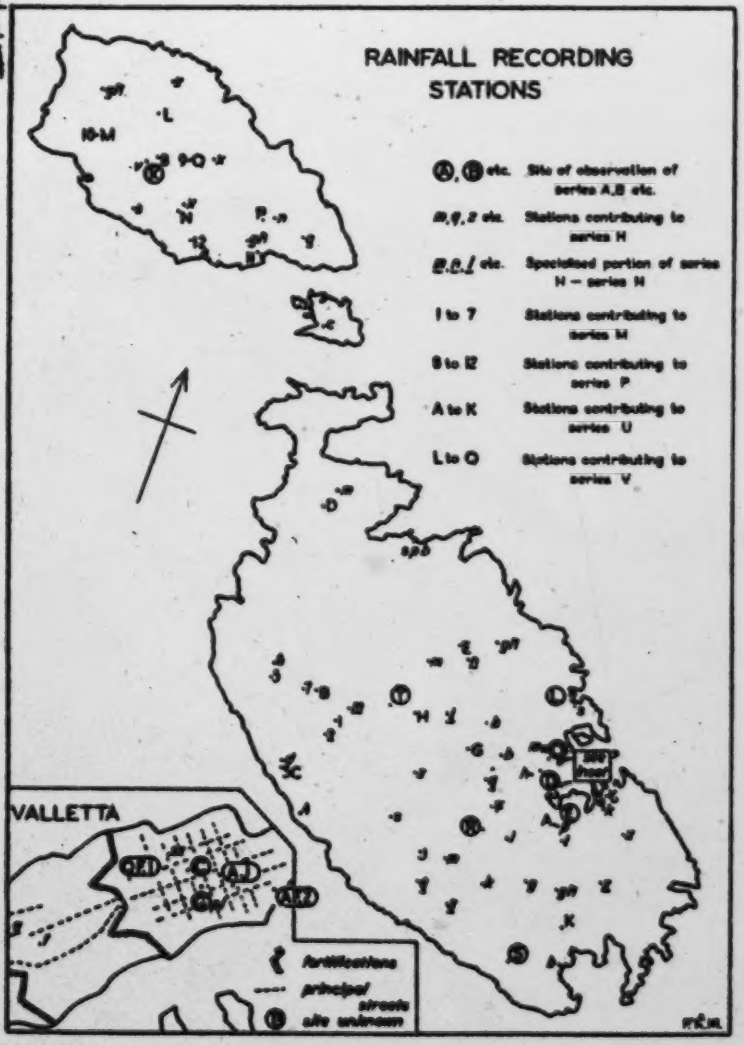

Fig. 9 Rainfall Recording Stations.

[p. 57-A]

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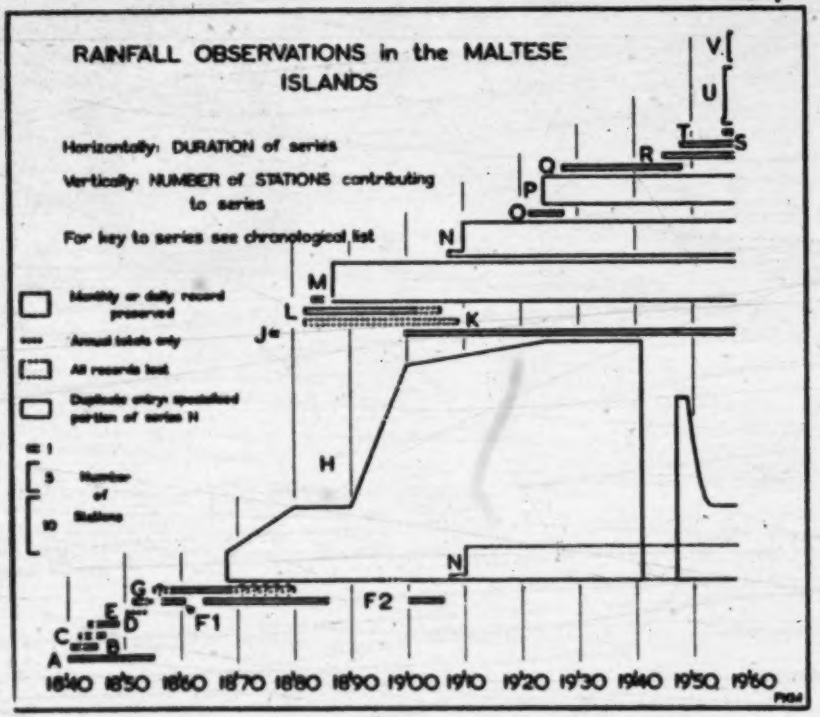

Fig. 10 Rainfall Observations in the Maltese Islands.

[p. 57-B]

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D. 1844-49, on a site in the Via San Guiseppe, Hamrun. Mss. are lost. Incomplete publication of monthly data in Delicata, 1846, and also by the *Societa Economico-Agraria*, 1849 and 1850 (7).

E. 1851-54, probably at the Corradino Prison, Pawla. The mss. are lost but annual totals appear in Zammit, 1855 (8).

F.1. 1852-61, probably at St. John's Cavalier, Valletta, by the Royal Engineers. Recording may not have been continuous during the period, as mss. in the Meteorological Office cover only the following years: 1852-54 and 1857-61. Hann, 1903 (9), published monthly readings for 1853-54 and 1857-60. Bateman, 1867 (printed by Seddal, 1870) (10) gave annual totals for 1852 and 1855, probably from this source. Both years are defective in the mss.

F.2. 1865-86 and 1901-06, by the Statistical Branch of the Army Medical Department, at the Garrison Hospital, Valletta (formerly the Hospital of the Knights of St. John). Mss. at the Meteorological Office begin with January 1866, but 1865 data were published by that Office in 1890. Bateman, 1867, gives the annual total for 1866.

H. 1868-1941 and 1947 to date, at various elementary schools in Malta and Gozo. Mss. giving monthly figures before 1891 and daily data after 1901 are preserved at the Royal University. Between those years the mss. are lost. Occasional publication of monthly data has taken place in contemporary issues of the Government Gazette (11). Those for the years when mss. are missing (1891-96, but not unfortunately 1897-1901) are particularly valuable. A mimeographed summary of the available ms. record giving means for Malta and Gozo up to 1913 was prepared at the University Observatory in 1950 (12). Agius, 1915 (13), gives a table of annual means 1901-11, for some of these stations. From 1916 to date, with a gap for the war years, monthly totals have been issued on duplicated and printed sheets by the University Observatory.

J. 1877-78, and 1900 to date, at the University Observatory where mss. are preserved. Later years, after 1909, issued in Royal University Meteorological Abstracts; daily data superseded monthly summaries in 1920. From 1904 to 1913, University observations formed the basis for the Malta section of 'Summary of the Weather in Egypt, etc.' (14).

K. From 1883-1909, unpublished observations were taken at the Seminary, Victoria, Gozo. The mss. are lost.

L. 1883-1906, at St. Ignatius College, St. Julian's. Again the mss. are lost but data was published in the Stonyhurst College Meteorological Reports up to 1902 (15). There was also occasional publication in Government Gazette of the period, Hann, 1903 (16), used monthly summaries of these data for the years 1885-1901.

M. 1884 to date, at one and later seven sites on the Rabat-Dingli Plateau. Observations were made by the Water Department who hold the mss. for the years after 1888. Earlier observations of this series were published by Chadwick, O., 1885 (17), 1887 (18) and 1888 (19). Monthly figures, the means of all seven stations, are published by Morris, 1952 (20), for the years 1890 to 1944.

N. 1908-10 to date. Summer rainfall readings ensured at five of the School Observation sites (H). Another station, of similar status, was set up at the Argotti Gardens, Floriana. The mss. of these observations are kept at the Royal University. Returns, in varying detail, have been issued with the other Royal University Meteorological Observatory Abstracts (J) (21).

O. 1922-28. A station set up for the Meteorological Office on Guardamangia Hill, Pieta. Ms. records available at the Meteorological Office, Luqa.

P. 1925 to date. Daily ms. records of data from five gauges in Gozo are preserved at the Water Department.

Q. 1928-48. Meteorological Office station at St. John's Cavalier, Valletta. The Office hold ms. records.

R. 1946 to date. Meteorological Office station at Luqa Airport. Mss. at the station with duplicates at the Meteorological Office. Currently published in the Overseas Supplement to the Daily Weather Report.

[Text continues on p. 60]

Table 8. Absolute frequency of rain-days yielding specific amounts of rain.
35-year period 1901-02 to 1935-36. Valletta.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Rainless days	1,058	923	817	644	633	668	602	809	892	1,004	1,008	1,078
Days with 0-0.99"	25	117	246	378	431	400	375	272	152	79	42	8
1-1.99"	2	10	14	17	15	15	11	4	6	2	-	-
2-2.99"	-	-	4	2	5	2	1	2	-	-	-	-
3-3.99"	-	-	2	1	1	-	-	-	-	-	-	-
5-5.99"	-	-	1	-	-	-	-	-	-	-	-	-
7-7.99"	-	-	-	1	-	-	-	-	-	-	-	-
11-11.99"	-	-	1	-	-	-	-	-	-	-	-	-
Total Days	1,085	1,050	1,085	1,055	1,085	1,085	989	1,085	1,050	1,085	1,050	1,085
Total rain-days	27	127	268	406	452	417	387	278	158	81	42	8
Total rain-days >1"	2	10	22	28	21	17	12	6	6	2	-	-
Total rain on days with >1"	2.28"	12.64"	53.61"	54.73"	35.24"	25.12"	17.17"	10.56"	8.55"	2.46"	-	-
% of Total rain occurring on days with >1"	22.5%	21%	24.5%	20%	14.5%	10.7%	9.5%	9.0%	10.0%	8.8%	0%	0%

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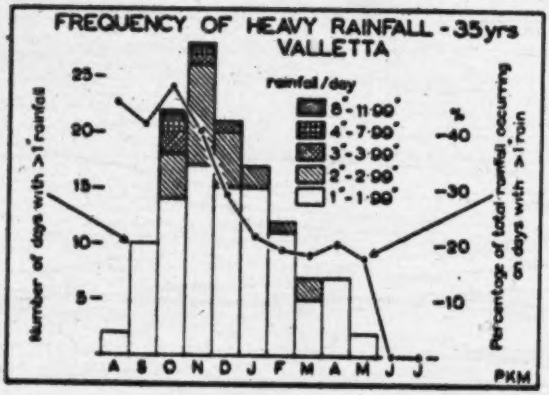

Fig. 11 Frequency of Heavy Rainfall - 35 yrs., Valletta.

*132 S. 1948 to date. Royal Naval Air Station, Hal Far, Ms. records kept at station, for two years, then sent to Director of Naval Weather Service.
114 T. 1956 to 1958. R.A.F. Station, ta'Kali, observations for most days maintained by Meteorological Office, Mss. at Meteorological Office, Luqa.
U. 1956 to date. At nine stations in Malta, autographic recording instruments have been established by the Water Department, who hold the mss.
V. 1957 to date. Autographic records for five Gozo stations. Water Department.

ANALYSES OF MALTESE RAINFALL

*132 DAILY RAINFALL

The number of 'rain-days' within a particular period gives at best a very general idea of the distribution of rainfall within that period, since the amount of rain which falls in one rain-day is an extremely variable quantity. At the same time, figures for daily rainfall inevitably, on many occasions, either divide a period of continuous rain into separate parts or add together separate falls occurring within the same 24-hour period.

These deficiencies in the basic data must be borne in mind in the following examination of daily rainfall which is based on the Valletta rainfall record for the 35 years beginning with August 1901. Table 8 and Fig. 11 show the frequency, within that period, of days with 1.0 inches or more of rain, the occurrences of various totals being distinguished. Thus, for example, in the 35 Decembers from 1901 to 1935 inclusive there were 21 days with more than 1 inch of rain, of which six had more than 2 inches and one had more than 3 inches. The table and figure also indicate the proportion of the total rainfall of each month which occurred on days with 1 inch or more of rain. This is seen to be at its highest in the autumn months, falling off rapidly through the winter with a minor peak in spring. No rain-days with totals in excess of 1 inch were recorded in June or July during the period under review.

Thus heavy rain is most frequent in the earlier part of the rainfall year, though its frequency in August has been exaggerated by the occurrence of two particularly heavy downpours in that month in 1905 and 1929. The peak in October accords with the high variability already remarked upon for that month and is reflected in the wide divergence between mean and median amounts (see Fig. 7).

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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The above data refer to Valletta, which lies in the drier, eastern part of the Island; the more rainy parts of the archipelago may be expected to show a higher frequency of heavy rain. This is confirmed by a comparison of data from seven stations in Malta (Table 9). Any given day's rainfall has been classified according to the maximum reading at any one of the seven stations. Even with this refinement, certain maxima have been missed including that of 16th October, 1913 (Fig. 12) when more than 15 inches fell at Vittoriosa while the reading for Valletta was only 11.87 inches.

Table 9. Frequency of maximum readings at selected stations on heavy rain days, 1910-1940.

	Floriana	Lija	Valletta	Żurrieq	Żejtun	Mdina	Naxxar	Total
Frequency	11	15	19	26	27½	51	62½	212
Per Cent.	5.2	7.1	9.0	12.3	13.0	24.0	29.4	100

During a 30-year period (1910-40) there were 212 days on which rainfall totalled 1 inch or more at one of the seven stations, an average of 7.1 per annum compared with only 3.7 for Valletta alone (1901-35). Only on 49 occasions, however, did rainfall exceed 1 inch at all seven stations, an average of 1.6 days per annum. Such data serve to illustrate the considerable regional variations which occur in the distribution of heavy rain in Malta, this phenomenon being, for example, much more common in the Naxxar and Mdina areas than in the eastern part of the Island. The distribution of heavy rainfall throughout the year differs little whether one examines the single station or seven station series (Table 10) but here again October stands out.

Table 10. Percentage frequency of heavy rain days.

	A	S	O	N	D	J	F	M	A	M	J	J	Yr.
Valletta 1901-02 to 1935-36	1.6	7.9	17.5	22.2	16.7	13.5	9.5	4.7	4.8	0.6	-	-	100
Seven Stations 1910 to 1940	0.9	8.0	10.8	23.1	18.9	13.7	10.8	7.1	4.2	1.4	0.5	0.5	100

An examination of daily rainfall records shows that mid-July is the driest period and is followed by a period of isolated but occasionally heavy showers which increase in intensity and frequency throughout the autumn months. Very heavy rainfall appears to be less common in January and February but there is a secondary maximum around the spring equinox followed by a decline during April, May and June. The most striking feature is undoubtedly the very great differences between individual years. Nevertheless, this, as all other evidence, picks out July as the truly dry month and for this reason the arbitrary break between years has, in the detailed analyses which follow, been imposed at the end of that month. The choice of August as the first month of the rain-year accords well with the traditional tenurial year, itself no doubt reflecting the passage of the seasons.

THE STRUCTURE OF INDIVIDUAL ANNUAL TOTALS

Variations in annual and monthly rainfall amounts are paralleled by great diversity in the composition of annual totals. The distribution of rainfall within any particular year, rather than the actual amount of rainfall, determines whether a year should be classified as 'dry' or 'wet'.

To illustrate this point, 12 years have been selected and their monthly totals

132 compared with the mean values. The years chosen include four in which the annual total was exceptionally low, four in which it was extremely high and four in which it was close to the average amount.

Table 11. Percentage deviation from monthly means: dry years.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Year	Total Ins.
1845	-100	-86	-78	-70	-93	-4	-72	-36	-56	-90	+165	-100	-61	7.95
1855	-100	-100	-94	-35	-71	-52	-81	+102	-92	-100	-100	-100	-56	8.99
1866	-47	-91	+0.3	-29	-84	-83	-89	-55	-65	-100	-89	-100	-60	8.16
1947	-18	-90	-45	-76	-41	-69	-70	-49	+4	-79	+67	-100	-57	8.86
Mean Ins.	0.17	1.12	3.11	3.86	3.83	3.49	2.16	1.64	0.93	0.42	0.09	0.04	20.54	

Table 11 shows the percentage monthly deviation from the mean for the years 1845, 1855, 1866 and 1947. It will be observed that, in each case, there was a marked rainfall deficiency in November, December and January, normally the three wettest months of the year. Above-average falls in other months (e.g. March 1855, June 1845 and 1947) were not sufficient to bring the annual total back to a point near the mean. In the 116 years of the Valletta rainfall record there have been 15 cases in which the rainfall for November, December or January was 1 inch or less and in all but two of these years the annual amount was well below average. The exceptions were 1915, when December had only 0.75 inch but November and February recorded 7.61 inches and 6.85 inches respectively, and 1949, with 7.14 inches in October and 3.97 inches in February.

Table 12. Percentage deviation from monthly means: wet years.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Year	Total Ins.
1858	+53	-34	-31	+43	+328	+194	+80	+34	-33	+31	-100	+2,900	+92	39.36
1873	-100	-30	-25	+36	+234	+64	-34	+340	-76	-7	-100	+3,100	+79	36.93
1927	-100	-66	-89	-7	+75	+104	+134	+182	+205	-100	-100	-100	+48	30.37
1951	+194	+468	+643	-46	-47	-20	-35	-123	-67	-71	-100	-100	+87	38.46

Four exceptionally wet years are illustrated in Table 12. Here again it is the November-January rainfall which has the greatest effect on the annual totals, though 1951, with below-average amounts in these months and extremely high totals in September and October, provides an exception - the large deviations from the mean in July 1858 and 1873 represent actual falls of only 1.2 inches and 1.28 inches respectively and thus have little influence on the totals for those years.

Table 13. Percentage deviation from monthly means: average years.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Year	Total Ins.
1888	-100	-27	+33	-66	-66	+114	+9	+68	-52	-40	-100	-100	+2	20.84
1931	-100	-64	-45	-19	+0.5	-30	+108	+18	-125	-95	-222	-100	+2	20.92
1939	-70	+370	+76	-64	-81	+2	-53	-66	-1	+26	0	-100	+0.2	20.58
1952	-100	-61	-71	-22	-20	+53	-66	+173	+40	+138	+567	-50	+0.4	20.62

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

In Table 13, corresponding data are given for the four years whose totals are nearest to the mean. Even here, monthly amounts deviate widely from monthly averages, there being only five occasions on which this deviation was less than 10 per cent. 1939 and 1952 display the greatest variability, 1888 and 1931 the nearest approach to average conditions throughout the year. 132*

Theoretically, it would be possible to classify the rainfall of every year in terms of lateness and earliness as well as dryness and wetness. In practice, the variation is so great that any such classification would obscure rather than clarify the picture. Nevertheless, two types of rainy season may be distinguished. One involves a long wet spell lasting two or three months, broken by short spells of dry weather, as in 1927-28 and 1928-29. Generally, this type consists of many days of moderate rainfall, though a few outbursts of heavy rain do occur. Periods of heavy rain are, however, more typical of the second type of rainy season, exemplified by 1911-12 and 1919-20, which consists of a series of short wet spells with relatively long dry periods between. In all years, the rains are broken by spells of dry, sunny and often warm weather which are of great importance to the farmer, most of whose ploughing and sowing must be executed in the wetter, winter months. Such fine spells are also not without significance to any proposed expansion of the tourist industry. [24]

Emphasis has so far been laid on the extreme variability of the Maltese rainfall in time; in the following discussion of exceptionally heavy rainstorms, spatial variations are equally important.

STORM RAINFALL

The rainfall of the Maltese Islands is predominantly convectional, resulting from rising currents in turbulent air masses, the turbulence being the result of heating or of contact between masses of air at different temperatures. The orographic effect is also important. The presence of a land mass rising 800 feet out of the sea is sufficient to 'trigger off' precipitation in an air mass already unstable while, in summer, heating of the air above a lightly-coloured, dry, soil- and rock-covered surface will increase instability and encourage the development of thunderstorms.

The definition of 'storm rainfall' is necessarily subjective. Observation would suggest that a continuous fall amounting to 2 inches or more leads to significant run-off and physical damage and that such conditions are likely to occur on any day with 3 inches or more of rain. Accepting this definition, it follows that seven storms were recorded between 1901-02 and 1935-36.

Figures 12 and 13, illustrate two of these storms. In the first, eyewitness reports indicate that the rain continued for no longer than two hours, while the second, that of 22nd November, 1915, is described by Agius (22): 'A thunderstorm of exceptional intensity passed over the island in the early hours... and the amount of rain registered was nearly equal to that recorded in another remarkable outburst... some 40 years ago'. About the same time, there was much rain damage in Sicily, where 60 people lost their lives, and in Sardinia. During the period in which the number of rainfall stations was small, several major storms may have gone unrecorded, as would have been the case in one of the most recent, that of 12th October, 1957, had the Valletta record only (1.27 inches) been available. It is fortunate that the presence of one of the authors in Malta during the autumn of 1957 enabled him to study the storms of that period and their effects in some detail.

Early in August 1957, very localised rainfall caused some damage and flooding in the centre of the Island (23) but it was not until 22nd September that the first significant fall of the year took place at Valletta. Rain fell on several occasions in late September and early October and on 11th-13th October occurred some of the most violent storms of recent decades (Figs. 14 and 15).

During the 24 hours beginning at 0900 on 11th October, the heaviest falls occurred in the south-west of Malta. Figure 16 shows hourly rainfall at Mizieb and ta'Kandja where autographic records are available. The rainfall of the 11th/12th took place in three distinct phases, the first of which was barely felt at ta'Kandja, while at Mizieb the second phase was relatively unimportant. The sequence of events appears to have been as follows.

[Text continues on p. 66]

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Fig. 12 Storm Rainfall, Oct. 16th, 1913.

Fig. 13 Storm Rainfall, Nov. 22nd, 1915.

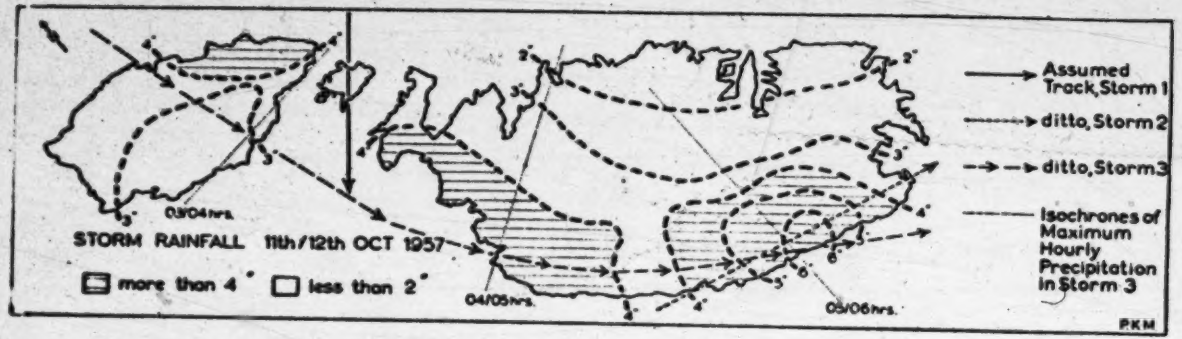

Fig. 14 Storm Rainfall, Oct. 11th/12th, 1957.

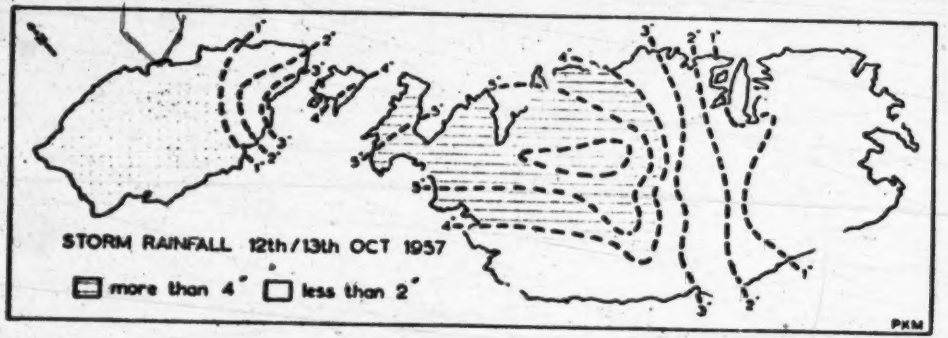

Fig. 15 Storm Rainfall, Oct. 12th/13th, 1957.

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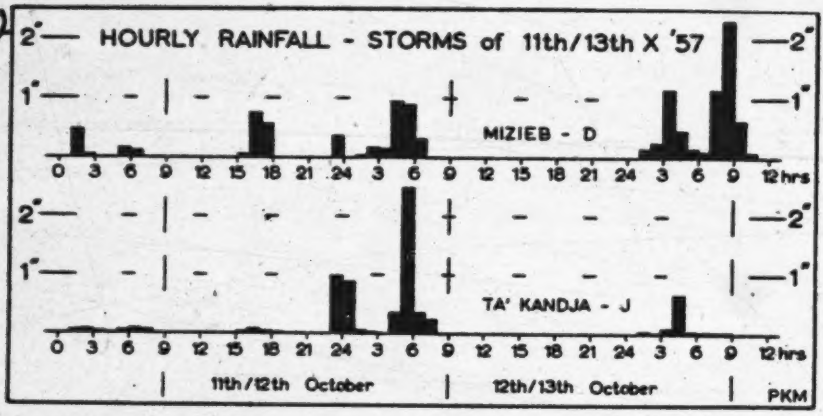

Fig. 16 Hourly Rainfall, Storms of 11th/13th, 1957.

A relatively minor storm centre, yielding 1.34 inches at Mižieb, moved south-west through the Comino Channel between 1400 and 1900 hours, on the 11th. This brought rain to all parts of the Island though amounts were small in the south-east, where Pawla received only 0.22 inch in the five hours. At Mižieb, closer to the storm centre, over 95 per cent. of the rain occurred within a two-hour period (1600-1800 hours). Some five hours later, a second storm passed from west to east across the extreme south of Malta giving rain for a little over three hours. More than 2 inches fell in the south (Wied Dalam 2.07 inches) but only 0.5 inch at Mižieb. The third and most violent storm moved south across Central Gozo and along the western and southern sides of Malta, passing out to sea near Żurrieq. Between 0400 and 0800 hours, 3.45 inches fell at ta'Kandja, 2.48 inches of it between 0500 and 0600. This represents the maximum intensity of precipitation during the 24-hour period. Gozo appears to have received not more than 1.75 inches from this storm, which gave a steadily increasing amount of rain as it moved towards the south-east.

About 24 hours later, heavy rain again began to fall and was remarkably concentrated in northern Malta. Two periods of maximum intensity are apparent, the first being present at ta'Kandja, where total rainfall was relatively low (Fig. 16). It appears that a storm centre moved south over Mellieha Bay to the Mosta area, causing general rain over the Islands from 0200 hours onwards. Mižieb recorded 1.15 inches between 0300 and 0400 hours. Renewed activity began about 0500, giving maxima at Dingli, Wied il-Kbir and Wied Dalam. Movement of the storm centre was then reversed and rainfall intensity increased rapidly towards the north, giving 1.10 inches at Ghajn Qajjet between 0600 and 0700 hours, 2.90 inches at Naxxar between 0600 and 0800 hours, and 3.46 inches at Mižieb between 0800 and 1000 hours. Rainfall in the Islands ceased early in the afternoon.

The contrasts between these two storms, occurring on successive days and yielding comparable rainfall intensities, warrant further investigation in which autographic rainfall recording will play an essential part.

Thus, many parts of the Islands received as much rain in 48 hours as they have, on occasions, received in the whole rainy season. In many areas, too, the rainfall of preceding days had already saturated the soil and filled the drainage channels. The effects of the storms of 11th-13th October are difficult to assess since they had been preceded by rains of moderate intensity and were followed by an abnormally wet period. Damage to autumn-planted potatoes, for example,

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

should be ascribed to the general wetness of the season rather than to these storms alone. A general picture of the damage can be obtained from the local press (24) but certain aspects, of interest to the hydrologist and agriculturalist alike, are worthy of elaboration here. The notes which follow are based largely on the experiences of the farmers themselves. 132*

There are some ways, perhaps, in which storms such as those of 11th-13th October, 1957, may be beneficial, in filling the rock-cut cisterns, in clearing debris from wied channels, in removing accumulated salts from irrigated land and in transporting soil from karstland on to the terraces below, but such benefits, affecting relatively few farmers, would be more than offset by damage to the crops and lands of a far greater number. 132* 241 731

Several types of damage can occur in times of torrential rain. Plants are damaged by direct impact, walls weakened by saturation of soil between the stones, clay masses slide downhill. Run-off causes sheet and gully erosion of the soil, washes away dams, walls and roadways and removes growing plants from the ground. In valley floors and low-lying areas, dams are silted up and water courses overflow to flood the more level land.

Fortunately, there were few standing crops to be damaged. The small part of the grape crop remaining to be picked was completely destroyed but cauliflowers and tomatoes were little affected. In many cases, however, sulla seed which had germinated was washed away and October was too late for re-planting. In some cases, vetches were sown as a replacement crop but, where the soil remained so wet as to prevent later ploughing, no crop could be raised until the following winter. Some farmers made fortuitous gains: one, near Kirkop, harvested more than nine hmiel of sulla from a vine field on to which seed had been washed. In the Wied tal-Pwales, melons, stored in the open were washed out to sea.

Farmers with flat land draining a large catchment area suffered severely from flooding. Very late tomatoes, grown to exploit improved marketing conditions, together with much of the autumn-sown potato crop were lost or severely damaged. This was particularly the case in Bur Marrad, where floodwaters stood for several weeks, and in the Wied tal-Pwales. Violent run-off caused extensive damage in several areas, despite the traditional careful terracing of steep slopes. Though sheet erosion in places removed an inch or more of the topsoil, the greatest damage was caused by gullying. Figure 17 illustrates one such case. The group of fields shown here lies on a natural terrace formed by the Upper Globigerina overlain with Blue Clay, above St. Paul's Bay. The damage to these fields is a product of the rain falling within them, since they stand on a spur and were not affected by run-off from higher areas. Similar damage occurred in other sample areas of steep slopes, clay soils and maximum storm rainfall; at Mgarr, Rabat and Wied ta'l-Isqof. Fields lying in the path of storm drainage suffered damage of a different type as shown in Fig. 18. Retaining walls built across a valley floor were swept away owing to the absence of any sort of drainage channel. Similar instances were noted at Mellieha, Mgarr, St. Paul's Bay and Mqabba.

The worst damage naturally occurred in areas where steep slopes coincided with maximum rainfall intensity, i.e. in north and west Malta. Four hundred farmers submitted damage claims, of which 262 were accepted as warranting financial assistance. The latter group included 10 per cent of all registered farmers in the parishes of Mell'eha, Mgarr, St. Paul's Bay and Rabat and just under 5 per cent. in Mosta and Gharghur. Damage in other parishes was not considered sufficient to merit assistance.

It would appear that, in many parts of the Islands, a day's rain amounting to 3 inches is almost certain to lead to damage of the kinds indicated and since such rainfall occurs, in one area or another, at least once in every five years, more efficient drainage would appear desirable. There are, however, several conflicting factors to be taken into account. In drier years, the farmer wishes to limit drainage so as to obtain maximum soil moisture at the beginning of the dry season, while the hydrologist wishes to encourage percolation into subterranean aquifers (see p. 42). At the same time, valley floors, where damage is 132* 311

[TEXT CONTINUES ON P.69]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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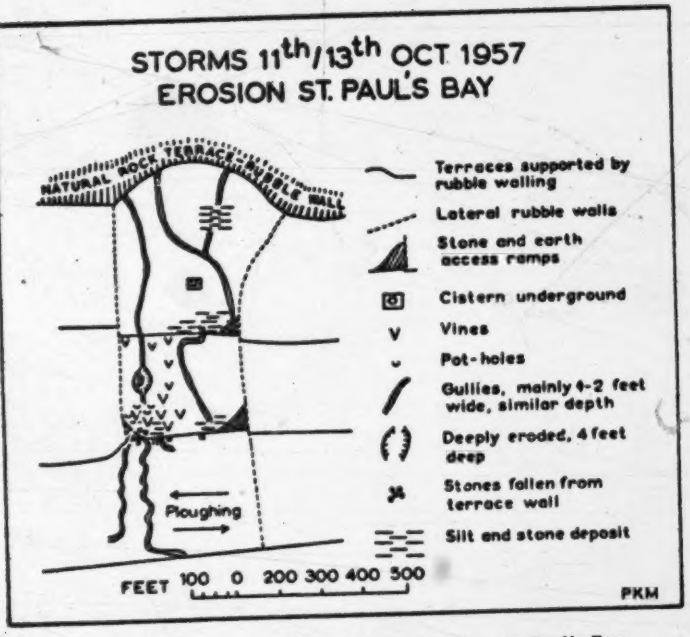

Fig. 17 Storms of 11th/13th Oct. 1957, Erosion, St. Paul's Bay.

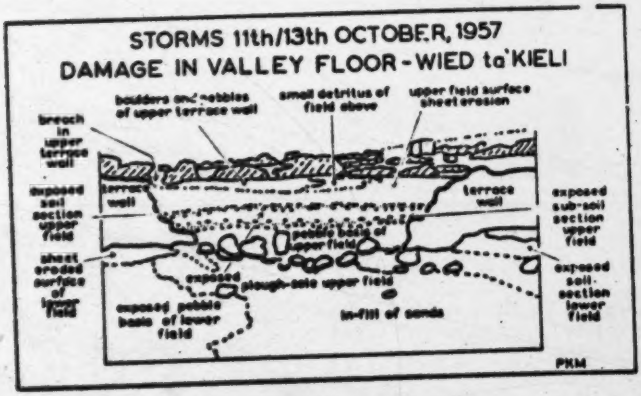

Fig. 18 Storms of 11th/13th Oct. 1957, Damage in Valley Floor, Wied ta' Kieli.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

likely to result from rapid run-off, are highly desirable for cultivation in most years because of their deeper soils and longer-lasting water tables. [132* 311]

Statistical analysis suggests that storms of the type described must be accepted as recurrent and normal and provision made to counter their effects. Damage to crops and lands might be considered as part of the normal cost of better yields in other years, though this raises questions of profit and loss accounting which have not so far been faced. Similarly, the conflicting interests of agriculture and water supply, referred to elsewhere in this book, must somehow be reconciled. Such problems must be considered against the fullest possible background of factual data.

REGIONAL DISTRIBUTION OF RAINFALL

Two conclusions may be drawn from the foregoing analysis of storm rainfall, namely that there are marked regional variations in the distribution of rainfall from any one storm and that certain areas are more subject to storms than others. This would suggest that total precipitation might show a distinct regional pattern an idea borne out by analysis of records from a number of stations. Figure 19 is based on the Schools rain gauge records (Series II) and, although these cover a period of only 15 years, they accord well with the results of Agius's calculations based on records for a number of stations from 1901 to 1910.

Most of the Islands' rainfall is brought by north-westerly winds, the convectional effect being strengthened by orographic uplift along the steep north-western coasts of Malta and Gozo. The distributional pattern of Fig. 19 is a product of these factors. Maxima in Gozo of over 24 inches are recorded where the northern plateaux lie directly in the path of prevailing winds. In Comino and the extreme north of Malta there are indications of a slight rain-shadow effect. The upland areas south of Ghajn Tuffieha, together with the Naxxar-Gharghur Hills, give the highest rainfall amounts in Malta. In the lee of these hill masses distinct rain-shadow areas occur, with annual totals below 20 inches.

Valletta, lying in the drier, eastern part of Malta, had a mean annual rainfall of 21.94 inches for the period 1924-39. This is 1.4 inches or 7 per cent. greater than the average obtained from the 116-year record; thus the isohyetal values of Fig. 19 should be reduced by that amount to give a truer picture of long-term means.

DEWFALL

Dew is the only other form of precipitation to occur in the Maltese Islands but this has not been measured by modern methods. Zammit's figures (25) (Table 14) would appear to be much too high, presumably because his method involved the use of a metal collecting pan (26). [114]

Table 14. Zammit's measurements of Dewfall. Inches.

1854		1854		1854		1855	
April	0.75	July	0.81	October	0.79	January	0.24
May	0.62	August	0.30	November	0.34	February	0.56
June	1.12	September	0.78	December	0.16	March	0.08

Seasonal variations indicated by these figures are, however, reasonably reliable and it is interesting to note that 66 per cent. of Zammit's measured dewfall occurs in the period April-September inclusive, a seasonal rhythm similar to that observed by Davdevani (27) on the Israeli littoral. The influence of dewfall on the growth of summer plants is obviously considerable and warrants investigation by more up-to-date methods.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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Table 15. Monthly rainfall - Valletta. Consolidated statistics.

(a) Totals by decades (in inches)

	A	S	O	N	D	J	F	M	A	M	J	J	Decade
1841-42/1850-51	0.36	1.36	10.30	15.89	31.72	33.06	46.77	20.56	15.87	9.40	6.10	1.08	192.47
1851-52/1860-61	1.25	1.44	5.59	23.45	45.56	41.74	41.07	20.80	20.98	10.31	3.66	0.30	216.15
1861-62/1870-71	0.45	2.26	3.03	36.28	30.60	30.38	29.92	16.73	18.97	12.41	2.37	0.73	184.13
1871-72/1880-81	1.28	1.09	18.61	35.93	35.47	45.40	31.16	19.32	20.87	4.93	3.05	0.57	217.88
1881-82/1890-91	-	0.78	7.51	29.55	28.57	43.66	36.16	22.86	11.84	5.83	3.15	1.21	191.12
1891-92/1900-01	0.47	0.43	8.75	26.24	35.84	45.32	35.11	19.21	11.20	13.76	8.47	1.30	206.10
1901-02/1910-11	0.57	1.88	13.30	49.58	33.70	40.75	33.06	25.42	12.27	9.33	2.97	0.55	223.38
1911-12/1920-21	-	0.85	13.02	29.23	49.89	19.20	25.91	23.18	17.47	11.45	4.12	2.11	196.43
1921-22/1930-31	0.02	1.50	9.76	19.85	35.78	41.76	37.54	30.76	20.43	9.55	4.58	0.41	211.75
1931-32/1940-41	0.05	1.21	13.42	24.50	34.92	43.19	35.75	23.80	13.62	7.74	5.11	0.77	204.08
1941-42/1950-51	0.01	3.82	3.04	28.04	29.78	41.99	30.76	17.01	16.47	4.99	3.19	0.22	179.32
1951-52/						Incomplete							

(b) Mean monthly rainfall. 116-years record.

A	S	O	N	D	J	F	M	A	M	J	J	Year
0.17	1.12	3.11	3.56	3.83	3.49	2.16	1.64	0.93	0.42	0.09	0.04	20.54

(c) Cumulative percentile values (rainfall in inches). 116-years record.

	A	S	O	N	D	J	F	M	A	M	J	J	Year
0%	-	-	-	0.11	0.26	0.36	-	0.01	-	-	-	-	7.95
10%	-	-	0.41	1.23	1.06	1.20	0.44	0.29	0.12	-	-	-	13.95
20%	-	0.05	0.90	1.65	1.68	1.78	0.83	0.56	0.20	-	-	-	16.44
30%	-	0.21	1.24	2.26	2.22	2.19	1.12	0.79	0.31	0.03	-	-	17.45
40%	-	0.38	1.75	2.86	2.71	2.80	1.42	0.98	0.43	0.13	-	-	18.49
50%	-	0.62	2.21	3.31	3.39	3.24	1.74	1.21	0.58	0.26	-	-	19.87
60%	0.02	1.05	2.88	3.63	3.88	3.64	2.14	1.54	0.90	0.37	0.02	-	21.78
70%	0.08	1.42	3.33	4.36	4.66	4.27	2.46	2.09	1.18	0.53	0.05	-	23.82
80%	0.20	1.92	4.38	5.09	5.89	4.95	3.16	2.54	1.50	0.74	0.13	-	24.64
90%	0.55	2.47	6.08	6.46	7.02	6.06	4.11	3.45	2.30	1.33	0.23	0.04	25.73
100%	2.51	7.82	23.08	12.87	12.79	10.26	7.21	7.18	4.25	3.23	1.36	1.28	39.36

(d) Median, Quartiles, Inter-quartile range. 116-years record.

Median	A	S	O	N	D	J	F	M	A	M	J	J	Year
Median	-	0.62	2.21	3.31	3.39	3.24	1.74	1.21	0.58	0.26	-	-	19.87
Upper Quartile	0.15	1.60	4.15	4.67	5.32	4.80	2.99	2.35	1.30	0.61	0.09	-	24.36
Lower Quartile	-	0.08	1.17	1.82	1.96	1.95	1.04	0.72	0.28	0.04	-	-	17.21
Inter Quartile Range	0.15	1.52	2.98	2.85	3.36	2.85	1.95	1.63	1.02	0.57	0.09	-	7.15

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
E26 Malta E26

(e) Frequency of rainless months. 116-years record.

	A	S	O	N	D	J	F	M	A	M	J	J
Per Cent.	58	16	2	-	-	-	2	-	2	21	55	73

(f) Mean rainfall days. 35-years record.

	A	S	O	N	D	J	F	M	A	M	J	J
Rainless	30.2	26.4	23.4	18.4	18.1	19.1	17.1	23.1	25.5	28.8	28.8	30.8
0 - 0.99"	0.7	3.3	7.0	10.8	12.3	11.4	10.6	7.8	4.3	2.2	1.2	0.2
1 - 1.99"	0.1	0.3	0.4	0.5	0.4	0.4	0.3	0.1	0.2	0.1	-	-
2 - 2.99"	-	-	0.1	0.3	0.1	0.1	0.03	0.1	-	-	-	-
3 - 3.99"	-	-	0.1	0.03	0.03	-	-	-	-	-	-	-
4 - 5.99"	-	-	0.03	-	-	-	-	-	-	-	-	-
6 - 7.99"	-	-	-	0.03	-	-	-	-	-	-	-	-
8 - 11.99"	-	-	0.03	-	-	-	-	-	-	-	-	-
Total Raindays	0.8	3.6	7.8	11.7	12.8	11.9	10.9	7.9	4.5	2.3	1.2	0.2

(g) Percentage of total rainfall falling on days with 1 inch or more. 35 years.

	A	S	O	N	D	J	F	M	A	M	J	J
Per Cent.	22.5	21.0	24.5	20.0	14.5	10.7	9.5	9.0	10.0	8.8	0.0	0.0

(h) Percentage of all raindays having 1 inch or more. 35 years.

	A	S	O	N	D	J	F	M	A	M	J	J
Per Cent.	7.4	7.9	8.2	6.9	4.6	4.1	3.1	2.2	3.8	2.5	0.0	0.0

(i) Monthly distribution of all raindays with 1 inch or more. 35 years.

	A	S	O	N	D	J	F	M	A	M	J	J	Year
Per Cent.	1.6	7.0	17.5	22.2	16.7	13.5	9.5	4.7	4.2	0.6	0.0	0.0	100

(j) Variability coefficients of monthly rainfall. 116 and 35 years.

	A	S	O	N	D	J	F	M	A	M	J	J
Method 1. 116 yr.		255	134	86	99	90	112	135	176	219	∞	-
Method 2. 35 yr.	307	73	94	51	68	84	68	87	65	113	240	350

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

EVAPORATION AND EVAPO-TRANSPIRATION

In the foregoing pages, attention has been drawn to the great variety of rainfall conditions in the Maltese Islands and an attempt has been made to assess the character of 'wet' and 'dry' years and seasons. Such terms, however, can never be absolute in terms of rainfall amount, since 'wetness' and 'dryness' are the product of a variety of factors including run-off, percolation, sub-surface drainage and soil-moisture conditions which, together with evaporation, all play their part in determining the effectiveness of a given amount of rainfall.

Little attention has been paid to the measurement of evaporation in Malta though some early work was done by Zammit (28) during 1845 and 1855 and at the University Observatory in 1878 (29). However, the results, as tabulated in Table 15, are far from satisfactory. No other records of evaporation in the Maltese Islands are available and Mitchell's field experiments in 1957-58 break practically untrodden ground.

Table 16. Open Water Evaporation in Inches.
Zammit's and University Measurements.

	A	S	O	N	D	J	F	M	A	M	J	J	Yr.
Zammit 1854/55	8.0	7.7	4.4	2.3	1.7	1.7	2.3	2.1	5.0	6.0	9.6	10.6	61.5
University 1878	10.4	7.8	6.0	5.3	4.6	3.6	3.8	6.5	6.8	10.0	11.6	12.8	89.2

The early experiments referred to above were concerned with evaporation from an open water surface. From the agricultural point of view, evapo-transpiration from soil with a vegetation cover is of much greater significance. If a plant cover is provided with an adequate moisture supply, it will transpire at the greatest possible rate and the water given off in this way will be taken into the surrounding air at the potential rate of evapo-transpiration for the particular plant under the weather conditions prevailing at the time. Thornethwaite (30) and Penman (31) have indicated that the study of potential evapo-transpiration through a grass-covered surface yields results which may be applied under a wide range of conditions and which provide basic data for controlled irrigation development.

As a first stage in the study of the water balance in the Maltese Islands, two potential evapo-transpirometers were installed during the early summer of 1957, the design and operation of the instruments being based on the practice of the U.K. Nature Conservancy (32) and on techniques developed and tested at Seabrook, NewJersey (33) and Ibadan, Nigeria (34). The sites chosen were at ta'Qali Pumping Station and at the Royal Naval Air Station, Hal Far (respectively the sites marked H, in the centre of the Island, and S in the south-west in Fig. 9). The local environments of these sites are sufficiently dissimilar to give a fair indication of the possible range of conditions in Malta. It is hoped that this pilot scheme will be developed by the installation of other instruments in various parts of the Islands.

It was found necessary to make adjustments to the crude data obtained from the ta'Qali and Hal Far. The methods used, together with the installations themselves and their sites, are fully described elsewhere (35). The adjusted monthly data are given at Table 17 and Fig. 20.

Table 17. Values of monthly potential evapo-transpiration from field-tank observations 1957-58. (Adjusted.)
Expressed in rainfall equivalent (inches).

		A	S	O	N	D	J	F	M	A	M	J	J	Yr.
ta'Qali	1956-57									4.1	5.0	4.9	6.5	
	1957-58	3.0	4.1	3.3	2.0	2.3	1.6	1.3	2.7	2.4	3.3	4.9	5.0	41.3
	1958-59	3.3												
Hal Far	1956-57									4.6	6.0	5.4	6.5	
	1957-58	5.3	6.8	4.6	3.4	3.1	2.5	3.0	3.3	3.9	6.3	6.5	7.0	60.9

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Jones et al. K-5 (1955-1958) 1961

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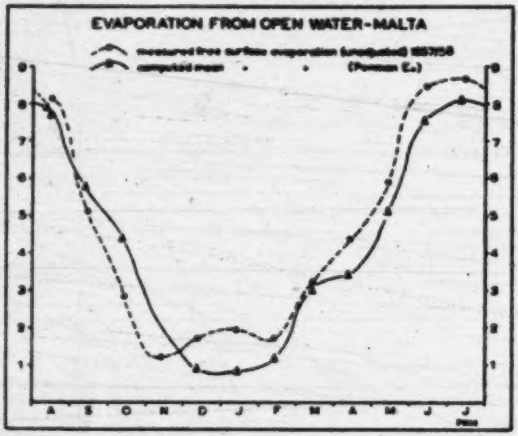

Fig. 22 Evaporation from open water, Malta.

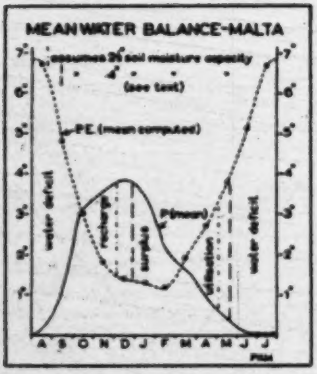

Fig. 23 Mean Water Balance, Malta.

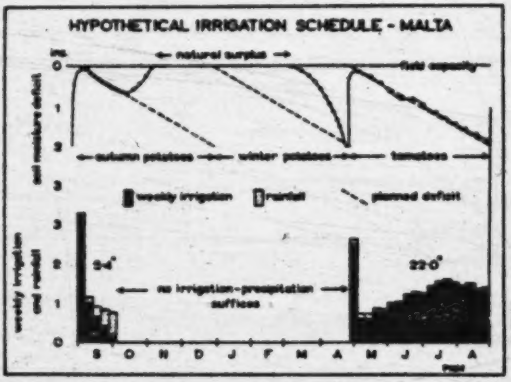

Fig. 24 Hypothetical Irrigation Schedule, Malta.

Despite the considerable differences in the two totals for the full year 1957-58 which may largely be explained by differences in the exposure of the two instruments, the broad trend of potential evapo-transpiration is clearly evident (Fig. 20). The maximum occurs in August when the rate approaches a quarter-inch per day and falls off rapidly to a minimum of about 0.05 inch in December, thence rising slowly, and somewhat irregularly, to the August peak. Certain of the monthly figures appear inaccurate. May and June 1957 would seem to be too high and too low respectively. Settling of the soil may be responsible for the irregularity of these early values but can hardly explain a similar pattern in 1956. Difficulties experienced in maintaining a vegetation cover may be a further factor in distorting the values for these months. The high November reading at Hal Far is almost certainly due to the 'bushy' vegetation at the time. 132* 312

Thornethwaite (36), Penman (37) and Crowe (38) have produced formulae for the calculation of P.E. from standard meteorological data. The application of these formulae to mean monthly data for Malta is shown in Table 18. Comparison with the ta'Qali and Hal Far figures is encouraging (Fig. 21). A further comparison is made in Fig. 22 between mean values computed according to Penman's formula for evaporation from an open water surface and the results of observations at the ta'Qali free surface evaporation tank, kindly made available by the Senior Water Engineer. Again, the two curves are tolerably close.

Table 18. Computed mean monthly evapo-transpiration, inches.

	A	S	O	N	D	J	F	M	A	M	J	J	Yr.
Thornethwaite, P. E.	6.2	4.7	3.4	1.9	1.3	1.0	1.0	1.4	2.1	3.2	4.7	6.4	37.3
Crowe, P. E.	7.1	4.8	2.6	1.7	1.4	1.5	1.4	2.4	3.3	4.4	5.4	7.0	43.0
Penman, Eo.*	8.0	5.0	4.5	2.3	1.0	1.0	1.3	3.1	3.5	5.2	7.6	8.1	51.5

*Evaporation from open water.

It seems probable that Zammit's figures, appropriately adjusted, would provide reasonably correct results. The University data, however, are excessive owing to deficiencies in the apparatus (the pan was only 2 inches deep and back radiation from its base would have heated the water and speeded up its evaporation). The low August values of these early readings may well be related to this insolation effect, since their rhythm is more closely linked with insolation than with air temperature. It is the latter which normally controls deep water evaporation and potential evaporation, though, as Penman points out (39), atmospheric humidity, wind and insolation are also significant. [114]

Clearly, further work is necessary before any final conclusions can be drawn. Observations made so far must be regarded as preliminary, though the results are sufficiently consistent to justify the following statements on the 'water balance' of the Maltese Islands.

THE WATER BALANCE OF THE MALTESE CLIMATE

The water balance is essentially the relationship between water requirements as expressed by potential evapo-transpiration (P.E.) rates and the availability of water from precipitation. Table 19 gives mean monthly values of P.E., computed according to the methods suggested by Thornethwaite and Crowe (40).

Table 19. Crude water balance - Malta. Inches.

	A	S	O	N	D	J	F	M	A	M	J	J	Yr.
Precipitation	0.3	1.1	3.1	3.6	3.8	3.5	2.2	1.6	0.9	0.4	0.1	0	20.5
Potential evapo-transpiration	6.7	4.8	3.0	1.8	1.4	1.3	1.2	1.9	2.7	3.8	5.1	6.7	40.1
Moisture surplus			0.1	1.8	2.4	2.2	1.0						7.5
Moisture deficiency	6.5	3.7						0.3	1.8	3.4	5.0	6.7	19.6

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

The figures show that annual P.E. exceeds annual precipitation by nearly 100 per cent., a moisture surplus of 7.5 inches for the months of October to February inclusive being more than offset by a moisture deficiency of 19.6 inches, almost as great as the average rainfall, in the remaining seven months of the year. In practical terms this means that the maintenance of a herbaceous vegetation cover throughout the year would require a water supply equivalent to 40.1 inches of rainfall distributed according to the monthly P.E. values. Rainfall itself supplies only half this amount and the remainder must come from other sources as, for example, when irrigation is applied. In the latter case, water is brought in from elsewhere, during the limited growing season of cultivated plants, to supplement the supply from precipitation. However, the position is less simple than suggested by the foregoing statement. Application of water at the required rate can damage the soil by preventing proper aeration and may also cause disease in the growing crop. On the other hand, if the total amount of water supplied to a crop falls below the cumulative P.E. rate of the growing season by more than an inch or two, then full growth of the plant is prevented. Furthermore, surplus moisture will be stored in the soil from the wetter months to augment the supply in months of rainfall deficiency, the extent to which this takes place being dependent on such factors as type and depth of soil and the nature of the crop itself. Thornethwaite (41) has shown that, in humid areas, the majority of crops can only abstract 4 inches of water from the soil in this way but such a generalisation cannot apply to many of Malta's extremely thin soils, which are physically incapable of retaining so much water. The moisture-holding capacity of the soil is also significant in relation to run-off which will only occur once that capacity has been exceeded.

There are as yet, no data on the moisture-holding capacity of Maltese soils. In the computations which follow (Table 20), three values have been assumed - 2½ inches, 4 inches and 6 inches - of which the intermediate is the most likely average. These fuller figures give a truer picture of the water balance than that available from the moisture surplus and deficiency data of Table 19.

It will be observed that the whole moisture surplus of October and November is absorbed in soil moisture recharge, that is in the replacement of moisture removed from the soil during the dry summer months and that it is not until December that an actual water surplus occurs and that there are, in fact, only three months with such a surplus (two in soils with 6 inches storage capacity), which will be expressed in direct run-off and in percolation into the water table.

On the assumption made in the computation of Table 20 that evapo-transpiration will take place at the full potential rate so long as there is any moisture stored in the soil it will be seen that the length of the growing season depends on soil moisture storage capacity. Thus, at the 2½ inches level, full plant growth is possible from October to early May (Fig. 23), at the 4 inches level, the season is extended by some two weeks and, at the 6 inches level, it would continue into early June. Water surplus also varies with soil character; so does the date at which significant run-off begins.

If the average soil moisture storage capacity is assumed to be 4 inches, December-February water surplus is seen to be 3.5 inches. Since this is based on the Valletta rainfall data it would be wise to raise this figure to 4.2 inches for the Islands as a whole (see p 75). Making the further (erroneous) assumption that the land surface is completely covered with soil, the total available water, including both percolation and run-off, would be some 7,000 million gallons. We have already seen (p. 45) that some 2,000 million gallons are used for irrigation and a further 2,400 million in the public water supply. If it is further recalled that a good deal of the precipitation is lost by direct run-off or by sub-surface percolation into the sea (p. 43) it will be realised that the 'water balance' is in fact in a precarious state of unbalance.

There are several implications here for the agriculturalist. In the first place, there is little prospect of obtaining additional water for irrigation purposes in years of average rainfall. Secondly, it is essential that excessive amounts of irrigation water should never be applied. Some indication of irrigation requirements may be obtained from P.E. data and an attempt has been made (Fig. 24)

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

Table 20. Water balance - Malta. Inches.
Assuming soil storage capacities of 2½ inches, 4 inches and 6 inches.

	A	S	O	N	D	J	F	M	A	M	J	J	Yr.
Moisture surplus			0.1	1.8	2.4	2.2	1.0						
Moisture deficiency	6.5	3.7						0.3	1.8	3.4	5.0	6.7	19.6
Soil storage capacity 2½ inches													
Soil m. recharge			0.1	1.8	0.6								2.5
Water surplus					1.8	2.2	1.0						5.0
Soil m. utilisation								0.3	1.8	0.6			2.5
Deficiency	6.5	3.7								2.8	5.0	6.7	
Soil moisture deficit	2.5	2.5	2.4	0.6	0	0	0	0.3	1.8	2.5	2.5	2.5	
Soil storage capacity 4 inches													
S.M.R.			0.1	1.8	2.1								4.0
W.S.					0.3	2.2	1.0						3.5
S.M.U.								0.3	1.6	2.1			4.0
D	6.5	3.7								1.3	5.0	6.7	
S.M.D.	4.0	4.0	3.9	2.1	0	0	0	0.3	1.9	4.0	4.0	4.0	
Soil storage capacity 6 inches													
S.M.R.			0.1	1.8	2.4	1.7							6.0
W.S.						0.5	1.0						1.5
S.M.U.								0.3	1.6	3.4	0.7		6.0
D	6.5	3.7									4.3	6.7	
S.M.D.	6.0	6.0	5.9	4.1	1.7	0	0	0.3	1.9	5.3	6.0	6.0	

to prepare an irrigation schedule on the basis of the figures discussed in this chapter. The schedule is for a field in which potatoes, sown in September, are followed by further potato plantings in January and by the setting-out of tomatoes in late April. Regular P.E., rainfall and irrigation are assumed and soil moisture deficit of 2 inches at the end of each crop's growth is permitted (a figure allowed for shallow-rooted crops in U.K. Ministry of Agriculture experiments). The schedule indicates a maximum irrigation of 3.3 inches in the week of planting first-crop potatoes (when soil moisture deficit must be restored) and a similar amount is applied to the young tomatoes. The potatoes require less irrigation in subsequent weeks when soil moisture is near capacity and rainfall is increasing while P.E. is falling. A total of 5.4 inches of irrigation is required by this crop. Winter-sown potatoes need no irrigation but they deplete soil moisture reserves which must be restored when tomatoes are planted. During the growing season of the latter crop, soil moisture is allowed to decline but P.E. is increasing and irrigation rates rise from 0.6 inch per week in early May to 1.5 inches in July, the latter being equivalent to 9,450 gallons per tonna. The tomato crop requires a total of 22 inches.

It must be emphasised that this schedule is based on average conditions and on an even distribution of rainfall within each month, conditions which rarely, if ever, occur. The method, however, might be more profitably applied on the basis of P.E. rates, rainfall and precise planting dates in particular seasons. When more information on P.E. rates in Malta becomes available, experiments in the application of the water balance technique to the problem of irrigation might well show a profit in a more efficient use of water supplies.

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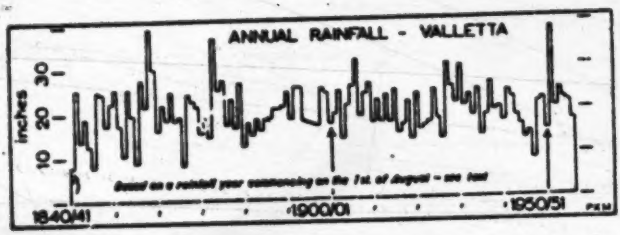

Fig. 25 Annual Rainfall, Valletta 1840-1957.

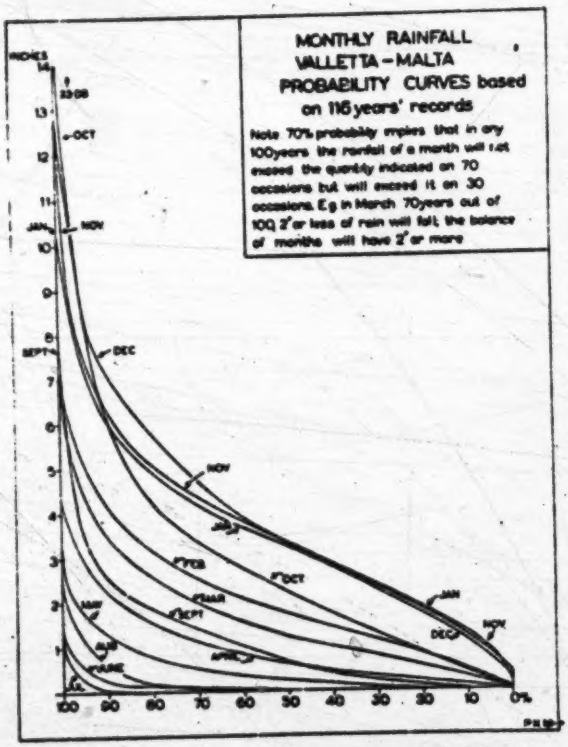

Fig. 26 Probability Curves, Monthly Rainfall, Valletta.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

THE MOISTURE REGIME OF THE MALTESE ISLANDS

The Maltese climate provides more moisture at the season when there is least demand for it, that is when the rate of plant growth is at its slowest. Conversely, when the potential for plant growth is highest, natural moisture is almost completely absent. Though winter temperature conditions allow the growth of a wide range of crops, some of the most valuable, e.g. tomatoes, would be unlikely to survive the winter season. Thus there have developed a number of types of crop management.

(1) Rain-fed crops are (a) planted before the onset of the autumn rains and watered artificially until adequate natural moisture is available, or (b) are sown mid-way through the rainy season when soil moisture is at a maximum. In all but the driest years, watering is unnecessary though, if applied, it can lead to higher yields.

(2) Crops dependent on soil moisture are generally planted late in the rainy season, when rainfall alone would be inadequate for their support. Land used in this way has generally been left fallow during the winter and repeatedly ploughed, thus keeping weeds down and reducing water loss from the bare soil. Even in average years, however, soil moisture will only support plant growth for a month or two and summer watering would be valuable but is not always possible.

(3) In irrigated areas, three crops a year are possible all depending to some extent on 'imported' water to supplement rainfall and soil moisture supplies. Areas in which this is possible, however efficient the methods used, are inevitably limited in extent.

Husbandry is largely controlled by considerations of this sort. Shallow ploughing is impossible until the onset of the rains has weakened hard surface crusts but is also difficult if the soil becomes excessively wet. The farmer thus hopes to cultivate and sow during the November dry spell (the Sajf ta'San Martin) which often follows earlier rains. In all but a few years, this traditionally hoped for dry period does in fact occur.

Ploughing is also carried out on a large scale in high summer when deep cultivation, with manuring, is carried out every fourth year. There seems to be no particular reason why this should be done in the summer months except that it is then that a large labour force is available. With mechanisation, labour supply is no longer a controlling factor but the practice persists. Certainly the movement of tractors and heavy ploughs about the countryside is most easy when the bulk of the land is fallow. The danger here is that deep-ploughed land may suffer soil erosion if there is an early onset of really heavy rain.

The timing and violence of the onset of the wet period are very uncertain. Generally the farmer aims at conservation of the early rains and does all he can to reduce run-off and to assist soil moisture recharge. If the autumn is wet, however, as in 1957, saturation of the soil and serious gullying may result from such traditional activities as the diversion of water from roads to fields by the construction of temporary earth dams and channels. A long term forecast of autumn weather would, if feasible, be of great value.

In the summer months, plant growth is often slow as a result of moisture deficiencies but there are obvious compensations. The ripening of vines continues unhindered, though the grapes may be damaged before harvest by early heavy showers. In spring and early summer, grains and legumes ripen and dry with little interruption.

There can be little doubt that current Maltese farming practices are adjusted to average conditions. It is the frequent occurrence of 'non-average' seasons which causes most damage (Figs. 25 and 26). Flexibility to cope with departures from mean conditions must be a major consideration in any plans for agricultural development.

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[P.83]

Chapter III

EDAPHIC AND ECOLOGICAL

A. Soils of Malta and Gozo (Fig. 27)

D. M. LANG, Ph.D.

FACTORS OF SOIL DEVELOPMENT IN THE MALTESE ISLANDS

Soil is a commonplace which everyone recognises but few would attempt to define or even describe. Joffe (1949) defines soil as 'a natural body of mineral and organic constituents usually unconsolidated, differentiated into horizons, of variable depth, which differs from the material below in morphology, physical make-up, chemical properties and composition and biological characteristics'. This definition, like many others, does not satisfy everyone. It does not emphasise, for example, that the soil is continually changing because the plants which grow in it and the active myriads of the soil microfauna whose home it is, cause changes in its characteristics. However, to include this and many other concepts which it might be desirable to use would require a long time and a lot of paper, because soil is essentially very complex. 134

There are, according to Dokuchaeff, five factors involved in the development of soil, and of these probably three, parent material, climate and time, are fundamental in the production of the soils of Malta. Topography, the fourth factor, is largely dependent on the first three, since landscape is largely moulded by erosion and deposition related to the parent structure, process and time. Biological influences, the fifth factor, despite the activity of plants and animals, is presently dominated by man's work, the effects of which are secondary, producing modifications of the existing patterns, but nonetheless sometimes profound.

TIME

Maltese soils are all rather young or immature since pedological processes are slow in calcareous soils like these, particularly where acidic drainage water is very limited in quantity. Certain soils, for example, the red brown clays of the Terra group (p. 92) are believed to have formed largely under the influence of processes which have been superseded. Under a changed climate the new very slow processes have so far produced little change in the soil profile. It is a relic of the old process and thus the soils are, in a sense, relic soils, but at the same time very immature (young) soils under the new climate, because the new process has produced so little change.

In the San Biagio series, very young, man-made, carbonate raw soils (p. 87) dating only from when they were mined from the rock, are found in front of undermined terrace backwalls. Only a few yards away much older soils are developed from the same parent rock, and they are xerorendzinas (p. 90). While the raw soil has been subjected to natural processes for less than 50 years, the xerorendzina has been developing over several hundred years. Thus time is an important factor in the soil's development.

CLIMATE

The climate of Malta and Gozo, is a good example of the Mediterranean type. It consists of hot dry summers, having a high rate of evaporation and no rain, warm and showery autumns normally with a rainfall deficit, short cool winters with enough rainfall for agriculture in most years, but leaving insufficient reserve in the soil to combat the warm drying springs again having a rainfall deficit. The variation on sites of the same type is obviously small, but between deep-set valleys, north-facing scarp slopes and the main open plateaux or south-facing slopes there are often wellmarked differences in vegetation, both weeds and crops. The difference is striking because of the difference in insolation, and 132 134

[Text continues on P.85]

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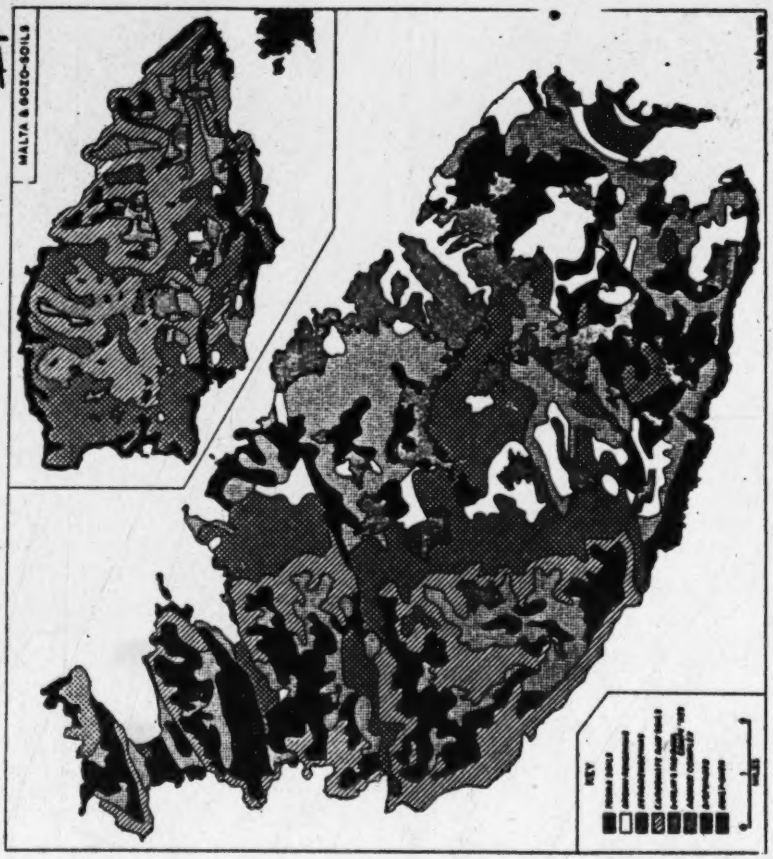

Fig. 37 Soils of Malta and Gozo.

thus of surface temperature regime. However, soil profiles show virtually no difference between different sites, and it is only in exceptionally wet locations that the normal pattern of aridity is sufficiently overcome to allow the development of noticeable humus horizons. 132 134

In the past there have been broad oscillations of climate responsible for the production at different times of widely differing soil materials such as the 'red soil' (red brown Terra clays), stoney calcareous debris and aeolian sands which are now the materials parent to the present soil. The present climate, however, is not a leaching climate.

This uniformly arid climate is in strong contrast with that of some other latitudes, for example, that of Britain, and suggests itself as the reason for the restricted range of soils found in Malta and Gozo.

PARENT MATERIAL

The rocks which are ancestors to the soils are all closely similar in type chemically, and only moderately variable in physical characteristics. Thus only a limited range of soil types is to be expected. However, the massive, well-jointed limestones have developed karst landscapes because they favour percolation and solution more than do the porous but nearly impervious finer-textured limestones. On the karstlands the red brown Terra clays have developed on almost completely de-calcified residues from the limestone, but on the other landscapes there has been a minimum of decalcification, and the soils are very like the rocks from which they have been formed. Thus, the composition of the impurities in the limestones from which they were originally weathered mainly decides the nature of the Terra soils (although inblown calcite has increased their calcium carbonate content). Similarly the texture and detailed composition of the carbonate raw soils and xerorendzinas is closely dependent on the parent material. The parent material type is therefore important for Maltese soils because it partly determines what pedological processes can take place and especially because the processes taking place now have little effect. 133 134

TOPOGRAPHY

Topography generally influences the development of the soil in a variety of ways, and chiefly through modifications of climate, variable conditions of drainage and effects on erosion and transportation processes. It has been noted that in Malta and Gozo the variations of topography produce sites with very different insolation conditions, but the effect on soil processes is negligible. It is only in the extremely freely-drained conditions of some hill tops, where lime crust yermas are simulated on parent materials of fine sandy loam texture that the effect of topography on drainage conditions can be thought to be sufficient to produce soil modifications. Flooding with sea water may be attributed to topography, and in the Alcol series at Salinas, for example, slight salinity is the result.

The effect of topography on erosion, transportation and deposition is more noticeable. Under former cooler climatic conditions, solifluction took place, and under the present conditions sheet or gully erosion occurs during the violent showers of late autumn. The result is that there are strikingly different eroded and alluvial phases of the same soil series in some locations. On the Blue Clay soils the alluvial, light clay type is more favourable to agriculture than the eroded heavy clay type which is in patches alkaline or saline-alkaline.

BIOLOGICAL INFLUENCES

Apart from man's activities, biotic factors are of relatively small importance in the soils. Humus horizons are only developed under well grown and long undisturbed vegetation, which is very rare. The organic-matter deficient humus forms of the surface horizons of the cultivated soils can only be seen easily under the microscope, and the soil fauna seems to be very limited in numbers. 134 311

The modifications of the soil pattern produced by man are, on the other hand most profound. Apart from the large area of Malta which has been covered by human habitations, factories, airfields and military installations, where the

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134 soil has been bulldozed or covered up and is unrecognisable, the pattern of soils
134 in the agricultural land has been changed.
311 Firstly, nearly all the land in Gozo and most of the land in Malta has been terraced, on slopes so steep that the terraces must be very narrow, with very high retaining walls. The backwalls of the terrace are often cut into the solid rock and the resulting rockflour mixed with the soil material, while the floor of the terrace is quarried and made flat and then covered with rubble before the soil material is replaced on it.

Terracing of this type is very widespread on the cultivated areas except on alluvial parent materials, and gives rise in the karst lands to a complex of soils described as l-Iklin complex, ranging from carbonate raw soils to Terra-like soils, dependent on the amount of rockflour and rubble added to the original Terra soils during terracing.

Where quarries have been dug, the soil has been replaced in a similar way, with added rubble, refuse and rockflour in terraces which have been built up at several levels in the quarry. The resultant mixed soils have been referred to as tad-Dawl complex, which is rather similar to l-Iklin.

The use of inorganic town refuse on the soils and the large-scale carting of soil material away from building sites to wherever it may be desired adds to the generally rather confused nature of many of the soils, and since about 0,1 per cent. of the total soil cover is moved every three years in this way, the scale is quite large.

To summarise, the pattern which man modified was dependent mainly on parent material, time and the ineffectiveness of the climate in producing soil horizon development. The effects of utilisation by man have produced widespread and profound modifications of that pattern.

Table 21. Classification of the soils of Malta and Gozo according to the system of Kubiena (1953).

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Division	Class	Type	Sub-type	Variety	Series
A. Sub-aqueous					
B. Semi-terrestrial	BD Salt soils		Secondary salt soils		
C. Terrestrial	CA Terrestrial raw soils	Syrosem	Carbonate Syrosem (Carbonate Raw Soil)		Fiddien Nadur Ramla San Lawrens
	CB Not represented in Malta				
	CC Rendzina-like soils	Rendzina	Xerorendzina		Alcol San Biagio tal-Barrani
	CD Not represented in Malta				
	CE Terrae Calxis	Terra	Terra fusca	Earthy terra fusca	tas-Sigra
			Terra rossa	Sialitic terra rossa	Xaghra
	CF CG CH CI CJ	Not represented in Malta			

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The table (21) which is based on Kubiena's classification illustrates the small range of soils found in Malta and Gozo. There are no sub-aqueous soils, and only a small fraction of one per cent. of the soils are secondarily saline and thus classified as semi-terrestial, although some of the present soils (for example, Alcol) are developed on alluvial (semi-terrestrial) soils, from an earlier climatic era.

In the account following we describe first the carbonate raw soils, which are only slightly differentiated from their parent material and then the xerorendzinas in which the humus development becomes apparent. The San Biagio soils are typical xerorendzinas but the Alcol and tal-Barrani series contain sufficient brown sesquioxide clay material to give the soils deeper brown colours than are usual. In the former case this is because of the red-brown clays in the sediments on which the soils are developed, and in the latter case partly for similar reasons and partly because of slight accumulation of precipitated iron. Finally, we consider the reddish-brown Terra soils in which limestone weathering has progressed so far as to leave largely decalcified residues of limestone as the mineral body of the soil. The writer inclines to the view that the removal of calcium carbonate in both the last mentioned soils occurred under moister conditions than now obtain, a view with which some authorities are not entirely in agreement.

CARBONATE RAW SOILS

According to Kubiena (1953) the carbonate raw soil is a 'very young raw soil, extremely low in humus, characterised generally by a dry summer (on the surface partly also hot summer) soil climate on calcareous parent rocks'.

These soils have an (A) C profile, that is to say an (A) horizon overlies the C or parent material horizon. The (A) horizon is the zone most strongly colonised by organisms, the well aerated superficial layer of soils in which no recognisable humus horizons have developed. It has a recognisable humus form, raw soil humus consisting of a few fragments of undecomposed plant remains in some of which there are cavities containing droppings of mining animals; the mineral grains are calcite. Usually only the calcite sand will be obvious to the unaided eye.

Occasionally the (A) horizon will overlie a Ca horizon of secondary calcium carbonate precipitation above the C horizon.

In Malta and Gozo four series of carbonate raw soil have been distinguished, on the basis of variation in the parent material to which the biological soil is so closely related. These are the Nadur, Ramla, Fiddien and San Lawrenz series. The organic matter content is very low and only in one surface sample of 13 profiles sampled was as much as 2 per cent. found, while in most cases there was only 1-1½ per cent. Lower horizons generally showed less than 1 per cent. organic matter. At the same time the calcium carbonate content was high, about 80-90 per cent. in soils derived from the soft limestones and 30-60 per cent. in those derived from the Blue Clay.

NADUR

Parent material and location: The Nadur series is mainly developed from weathered calcareous sandstones of Quaternary age and similar materials from the lower part of the Upper Coralline Limestone, and the Greensand formation, mixed with downwashed red clay material of the Xaghra soil from the Middle Upper Coralline Limestone. The Nadur soil is usually developed as a narrow belt along the upper slopes of the scarps, and is only more extensive where the scarps give way to broad gently sloping valleys, as at Nadur and Xaghra and in part of Wied l-Isemu.

Description: A typical profile is

0 - 12"	Reddish brown, gravelly loamy sand or gravelly sandy loam; very gritty; single grain to very weak medium granular structure; loose.
12 - 27"	Yellowish red, gritty sandy loam, single grain to very weak medium granular structure.
27" plus	Off white, friable coarse-grained limestone.

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Table 22. Summary of chemical analyses of samples from the surface horizon of normal soils (means and extremes)

GENETIC CLASSIFICATION, SERIES AND TEXTURE TYPE		CHEMICAL PROPERTY	Organic matter per cent.	Active $CaCO_3$ per cent.	pH	Total phosphates per cent.	Readily available phosphates p.p.m.	Total exchangeable bases milli-equivalents /100 gms.	Individual bases as per cent. of total: Calcium	Magnesium	Sodium	Potassium	No. of samples
CARBONATE	Nadur Ramla	Sand to sandy loam	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8
RAW	San Lawrenz Fiddien	Clay loam and light clay	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7
SOILS	Fiddien	Heavy clay	1.4	13.0	8.70	0.19	22	24	96	24	5.8	4.8	1
HYDRO-	San Biagio Alzul	Sandy loam to clay	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3
MENDOMIAS	tal-Barrani	Silt loam, loam, clay loam	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4
TERRA SOILS	Xaghra tas-Sigra	Clay, loam and clay	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6

The soil is usually reddish in colour because of the small admixture of red sesquioxide material, but this is sometimes missing and then the soil is greyish or slightly yellowish, while the other soil characteristics are unchanged. A variant found on the glauconitic facies of the Greensand covers only a few acres - a deep greenish buff loamy sand. [34]

Sometimes the fields occupied by the Nadur Series contain fallen blocks of Coralline Limestone, and often they are very small and strongly terraced. Frequently they are abandoned, or devoted to flowers, but where in use, vines, and to a small extent, tree fruits are grown. [311]

RAMLA SERIES

Parent material and location: The Ramla soils are formed on sands of contemporary dunes at Ramla in Gozo and sands from the Quaternary dunesand bed at Armier in North Malta, where they are mostly man-made having been excavated from the dunesand bed. Where blown sands have been deposited, a sequence of parent materials giving a complex of soils (The Armier complex) of Xaghra and Ramla series and intermediate types is also found; on Qortin tan-Nadur in Gozo and on Marfa Ridge, south of Armier.

Description of a Ramla Series soil not recently cultivated:

0 - ½"	Oat grass emerging from a very thin A.F. layer composed of a dense mat of decaying grass leaves.
½ - 7"	Brown sand; single grain structure, grains 'strung' on abundant grass roots; no stones; dry.
7 - 14"	Brown sand; single grain structure; slightly moist.
14 - 40" plus	Strong brown sand; single grain structure; no stones; moist.

In agricultural use without a grass cover, these soils show even less horizon differentiation; they are almost completely uniform, except where they have been 'maried' with other soil materials.

These soils are generally terraced, but the fields are relatively large and the terrace walls are not high. [311]

FIDDIEN SERIES

Parent material and location: The Fiddien Series is mainly developed from well-weathered calcareous Blue Clay but a heavy clay soil is found on the relatively unweathered (calcareous) Blue Clay which is sometimes saline or alkaline. In both cases the topsoil may show an admixture of downwashed red clay and sandy materials from the soils upslope on the scarps in which the Blue Clay is mainly found.

Usually the unweathered Blue Clay is near the surface at the head of the scarp slope so that the heavy clay is upslope from the lighter clay. On the gentler slopes the light clay is extensive, and in total area far exceeds the heavy type. The differentiation is important since the heavy type is occasionally alkaline or saline alkaline, because of the nature of its parent material.

Description:

Medium or heavy clay type

0 - 10"	Olive clay (dry); moderately well developed fine to medium sub-angular blocky in large prisms; plastic and sticky.
10 - 30"	Olive clay (moist); massive; plastic and sticky.
30" plus	Dark blue green clay, unweathered. In field sloping 10 degrees with a 'slump-shoring' 4 feet high terrace wall at the front face.

Clay loam and light clay type

0 - 16"	Grey brown gritty clay loam; weakly developed fine granular structure; sticky, moderately plastic; numerous glauconite particles.
16 - 30"	Grey brown gritty clay loam; better developed granular structure in angular blocky compound peds; more compact.
30" plus	Grey brown gritty clay loam; well developed coarse prismatic structure. In flat field 40 yards across with a 3-feet drop at one wall.

The fields in which this soil is found are usually either unterraced or have minimal terracing as in the descriptions above. Frequently unterraced slopes [311]

[134] [311] of over 20 degrees which are worked can be seen, but at slopes over 30 degrees the soil development is very poor, there may be gullying and the land is unworked.

SAN LAWRENZ SERIES

Parent material and location: The soils of this series are related to those of the Fiddien having as parent material Blue Clay and Globigerina Limestone alluvium and colluvium overlying Globigerina rock. In the normal sequence of soils down a scarp slope the series lies below the Fiddien and above the San Biagio.

Description:

0 - 1"	Brown clay loam; small granular structure; slightly stony; dry, powdery and loose.
1 - 13"	Brown fine sandy clay loam; weak medium granular structure; some gravel; very friable and slightly moist.
13 - 40"	Olive brown fine sandy clay loam to clay; well developed fine angular blocky structure; compact; plastic and sticky; moist.
40" plus	Pale brown fine sandy clay loam to clay; weak medium granular structure; gravelly, mostly decaying Globigerina rock.

[311] The fields in which the series is found are usually terraced, and sometimes have tall rock-face cuts at the back. The terraces are seldom very narrow, while those of the San Biagio series often are.

XERORENDZINAS

According to Kubiena (1953), the xerorendzina, also called dry rendzina, is a 'rendzina, ash grey in colour, usually very loose, when dry in general very powdery, with extremely high chalk content often also of water soluble salts, particularly gypsum; occurring in dry regions'. This soil is very similar to the South Russian serosem or grey earth of the dry steppes.

General description: The xerorendzina has an AC profile. The grey, shallow, loose, calcareous A horizon, with mull or mull-like rendzina moder humus form usually passes through a well developed whitish Ca horizon into hard parent rock C. It is sometimes difficult to distinguish from a carbonate raw soil, differing in little but the humus form. In Malta and Gozo two series are classified as xerorendzinas, one of which is not typical but is most conveniently called by that name.

The organic matter content of the surface horizon averaged over 2 per cent. in five samples from the San Biagio series, 1.7 per cent. in four samples of the Alcol series, but 3 per cent. in three samples of the tal-Barrani series rising to 6 per cent. in samples of uncultivated soil. The calcium carbonate content of these soils estimated from a small number of samples is 55 to 80 per cent, but some areas of the Alcol and tal-Barrani series probably contain less.

SAN BIAĠIO SERIES

Parent material and location: This soil is developed from the weathered Upper Globigerina Limestones, and intercalated thin beds of iron-rich and phosphatic nodules, that appear both in the tall scarps of Malta and Gozo and in relatively flat plateaux. Consequently the sites on which the soils are developed are quite varied, and eroded and alluvial-colluvial phases are as common as a normal phase.

Description:

Eroded phase

0 - 7"	Very pale brown, silt loam, some gravel; moderately well developed medium sub-angular blocky structure; sticky and slightly plastic.
7 - 10"	Pale brown slightly heavier silt loam; moderate fine angular blocky structure.
10" plus	Very pale brown, silty, soft laminated rock.

Alluvial-colluvial phase

Surface just dry after recent rain has a thin, cracking, alluvium crust. 134

0 - 10" Pale brown silt loam; weak medium sub-angular blocky to crumb structure; plastic, non-sticky.

10 - 28" Pale brown, slightly heavier silt loam; slightly compact; with almost massive structure.

28 - 72" Pale brown silty clay loam; massive.

The normal phase is between these two extremes in its characteristics, and is usually of the silt loam type.

The landscape appearance is very uniform, and the fields in which this soil is found are normally strongly terraced, with cut-rock faces at the back of the terraces, from which fresh rock flour is derived during ploughing and is incorporated in the soil. Many fields have been partly produced by 'mining' in this manner, and some patches of soil are still carbonate raw soils. For agriculture in the islands this series is probably one of the most important since it is very extensive, and widely used. 311 134

ALCOL SERIES

Parent material and location: The Alcol series is developed on the valley loams (Quaternary and Recent) which are partly alluvial and partly colluvial and occur in the broader valley bottoms. They are erosion products of Terra, rendsina and carbonate raw soils, they are often stratified and are generally, but not always, well sorted. In general the material parent to the present soil is deep and of heavy texture, but a few sandy types are found, and intercalated gravel or boulder horizons occur. The differentiation of the soil from the parent material is difficult, since there are no well developed horizons except those produced by tillage. 134

General description:

1. Uniform material

0 - 6" Pale brown fine sandy clay loam; large to medium crumb structyre; loose; very dry; numerous worm casts.

6 - 21" Pale brown silty clay loam; weak medium sub-angular blocky structure; moist; worm casts found.

21 - 72" Pale brown clay loam, passing to brown silty clay; weak medium sub-angular blocky structure becoming larger with depth.

72" plus Dark yellowish brown, similar to above, but very wet and possibly partly gleyed.

2. Stratified material

0 - 13" Reddish brown silty clay loam; moderately well developed medium granular structure; some worm casts.

13 - 16" Strong brown fine sandy clay loam; structure becoming laminar.

16 - 21" Reddish yellow very fine sandy loam; weak medium laminar structure; some gravel and cobbles; slightly moist.

22 - 45" Reddish yellow very fine sandy loam with many boulders.

48 - 60" Clay loam; very fine to fine angular blocky structure.

In general the fields in which this soil appears, are flat and consequently [311] unterraced.

In some places at the coast a saline ground water table is producing symptoms of salinity in the soil, but more usually the soils are merely strongly calcareous, neither saline or alkaline.

TAL-BARRANI SERIES

The tal-Barrani soils appear to be transitional between the San Biagio and Xaghra soils. They are developed mainly on Globigerina rocks of massive appearance and texture similar to the Franka, on which they are also occasionally found. The soils have been much disturbed and mixed in the making of terraces, and some have been artificially produced by man, by mixing rock flour and Terra soil material. [311]

Description:

0 - 10" Brown gravelly silt loam; with a thin crust (in dry weather) and below, moderately well developed crumb structure.

10 - 18" Brown gravelly clay loam becoming more gravelly towards the

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base; weak fine sub-angular or angular blocky structure.

134 18 - 24" Brown gravelly loam or clay loam mixed with limestone rubble.
24" The formerly calcreted, broken surface of the Franka or similar rock.

[311] The fields in which the tal-Barrani soils are found are often strongly terraced, for example, in the dissected Globigerina Limestone Plateau of south east Malta.

The hill top fields are naturally relatively flat and unterraced, but often show evidence of profound alteration of the rock floor by man.

TERRA SOILS

The terra soils found in Malta are principally earthy terra fuscas, but soils similar to siallitic terra rossa have been found, and there are certainly forms transitional between these two varieties.

The Terrae Calxis to which group the Terra soils belong, are according to Kubiena (1953), 'very mature, extensively weathered usually completely chalk free soils with ochre yellow, ochre brown to red coloured (B) horizons which contain iron in the form of ferric hydroxide with varying water content...' Terra fuscas are 'usually humus deficient loamy soils with ochre yellow... to reddish brown colour on limestone rocks, which contain ferric hydroxide in the form of limonite', and earthy terra fusca is described as 'in the top soil, loose to slightly compacted, usually dark matt brown coloured terra fusca with good crumb structure'. The earthy terra fusca usually has an A(B)C profile, with a humus deficient, thin grey brown A horizon in which the humus form is generally mull. This horizon overlies a thicker reddish brown ferruginous (B) horizon which usually lies directly on the parent rock C horizon. The soil has a marked tendency to form crumbs and very low plasticity.

Terra rossa is described by Kubiena as a red soil, usually humus deficient and decalcified, rich in inorganic colloids containing ferric hydroxide in water deficient compounds, the siallitic terra rossa being 'Terra rossa with high colloid content, when wet highly plastic, viscous, characterised by a dense ground mass rich in silicic acid'. In general terms the profile is similar to that of the earthy terra fusca, but the soil colour is red and the plasticity is strikingly greater due to the different colloids. The structure is consequently different also, the peds being angular fragments produced by drying and shrinkage.

These soils have an organic matter content in the surface horizon of 4.5 per cent. (average of six samples) rather more in the case of uncultivated soils, rather less in the case of cultivated soils. This is slightly higher than the organic matter content of the tal-Barrani soils and very noticeably greater than that of the other xerorendzinas, and the carbonate raw soils. They are atypical of the variety in that they are not completely decalcified, containing in two profiles sampled 2 to 15 per cent. calcium carbonate, although much of the calcite in these soils has been blown in. This is emphasised by the greater calcium carbonate content in the surface horizons. (Two to four times greater than just above the rock.)

In the Maltese Islands the terra soils are found on the karst landscapes of the more massive limestones, that is the Upper and Lower Coralline Limestone and the Franka. The dominant variety is earthy terra fusca, and the mapping units used are described as such, ignoring the local transitions to terra rossa.

The terra soils can be divided into mapping units in various ways and it was found most convenient to map those appearing as patches between limestone lapiés as one group and the partly alluvial types in valley bottoms, dolines and on flat land without lapiés as another group. In the map (Fig. 27) they are not separated, but their agricultural potentialities are very different, because while in one case rock occupies from 10 to 50 per cent. of the surface and the rock slope may be steep, in the other case neither rock nor slope restricts the use of implements. In other respects they differ but little as can be seen from the descriptions below.

Soil between lapiés

Surface	A few limestone stones and an incomplete cover of xerophytic plants.
0 - ½"	Reddish brown gritty clay loam; moderately well developed medium crumb structure; hard.
½ - 24"	Reddish brown or dark red clay; well developed fine angular blocky structure; very dry and very hard.
24" plus.	Hard, white, semi-crystalline limestone with a calcreted surface;

Soil from site without lapiés

Surface	Bare after cultivation, a few stones.
0 - 15"	Dark yellowish red clay loam; medium crumb structure moderately well developed; dry.
15 - 36"	Yellowish red clay; moderate to well developed fine sub-angular blocky structure.
36"	Hard white crystalline limestone.

By definition of the mapping units these soils exist in fields which are unterraced and are often unenclosed.

COMPLEXES

The mapping units so far described are relatively simple, in that although they are not completely uniform the variations in the soils encompassed by each unit are small. However much of Malta has been very intensively used by man for a long period, and in some localities the effects on the soil are most pronounced - as described earlier. In such places the complication of the soil pattern is considerable and the mapping unit used is the complex. This denotes a fixed relation between a number of soil series alternating too rapidly to be separately delineated. The two units used covered: (1) the lands which have been quarried, where soil has subsequently been replaced in terraces below ground level; (2) the terraced terra soils (mainly karst-land). Both complexes are produced on land which formerly was covered by terra soils, and soils which it is possible to classify as terra are usually found to be most extensive now. However, in the quarrying and in the production of terraces by cutting away limestone lapiés, much rock flour and broken stone was produced, and much refuse and 'imported' soil was used to make up the soil. Consequently carbonate raw soils are to be found in many terraces, simulating the Nadur series, and the terra soils contain much material that is never found in the untilled soils of similar type. Between these extremes, soils which simulate the tal-Barrani Series are also to be found, presumably produced by the mixing of some terra soil with a great deal of rock flour.

These complexes are therefore dominantly disturbed terra soils with added matter, with numerous enclaves of xerorendzinas and carbonate raw soils. The alternation of the soils is so rapid that frequently within one small terrace 25 yards long by 8 yards wide all three types will appear, and the intensive terracing or quarrying is the distinguishing feature of these mapping units.

PROPERTIES AND UTILISATION OF THE SOILS

The interpretation of chemical analyses of calcareous soils is not always very clear. For example, the methods used for extracting exchangeable cations sometimes result in the extraction of calcium from calcium carbonate as well as from the exchange complex. Similarly figures given for readily available phosphate are of uncertain meaning, because the extractant cannot exactly simulate the ability of the plant to take up phosphorus which may be fixed by calcium carbonate. The figures given in Table 22 are therefore to be considered as a comparative guide. (It is thought that in this table there has probably not been much overestimation of calcium in the exchange complex because the highest measured values are correlated with the lowest values of calcium carbonate.) There is some difficulty of comparison with soils from other countries since the same analytical methods are not always used. Soils from

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134 Spain, Sicily, Cyprus, Palestine and Australia of similar description, give roughly similar analyses, but it is not worthwhile to compare data obtained by methods of which the details are not closely standardised.

134 311 The carbonate raw soils have been divided into textural groups for convenience in describing properties and utilisation. The sands, loamy sands and sandy loams are very dry, easily worked, rapidly warming soils which where practicable, are mainly devoted to vines (Nadur series) and fruit trees (Nadur and Ramla series). Because of their light texture they have relatively low values for nutrients; however, they appear to give satisfactory crops, and are probably quite satisfactory. The clay loams and light clays (San Lawrenz and Fiddien series) are sticky, water retentive soils, usually fairly well structured, but hard and dry in late summer, and with a tendency towards an alkaline condition locally. In some parts of Malta they are used for a wide variety of crops, vines, tomatoes, cereals, and potatoes, but are more often devoted to sulla, as in Ġnejna Valley and western Gozo. The Fiddien heavy clay, potentially valuable because of its high clay content, is usually alkaline, sometimes slightly saline and often has very bad water relations, so that it remains little used.

The carbonate raw soils, with one or two localities excepted, are terraced, or stand in steep slopes, so that there is little prospect of increasing the field unit size. Of the xerorendzinas, the San Biagio sandy loams and silty loams and the tal-Barrani loams are only unterraced on plateaux tops, while the Alcol clay loams and clays are almost never terraced. It is among these xerorendzinas, together with the level tas-Sigra soils in the karst areas that there is a chance of increasing field size sufficiently to allow mechanisation.

The San Biagio and Alcol series are, moreover, among the more easily worked soils, but appear, with the highest active calcium carbonate, low exchangeable bases, low organic matter and higher pH, to be among the chemically less-favoured soils. Observations of potash necrosis and iron chlorosis were made mainly on these soils. However, the reasonably satisfactory structure, easy tillage, and reasonably good water relations of these soils appear to compensate, for the soils are universally cultivated and appear to give satisfactory crops. Both series appear to be used for a wide range of crops, cereals, vines, rootcrops and market garden crops generally, the last mentioned particularly on irrigated land.

The tal-Barrani loams and clay loams, which comprise the brown rendzina soils, are found almost entirely in the heavily populated area of southern Malta, where they are intensively used, and almost universally terraced. They appear to be entirely devoted, apart from odd fruit trees along walls, to annual crops, principally cereals and potatoes. From the table (22) their chemical characteristics appear more favourable than those of most of the soils, and their structure and tillage properties appear to be fairly satisfactory. It is not known, however, whether they are more productive than, for example, the nearby San Biagio xerorendzinas.

The clay loams and clays of the Terra soils are all, potentially at least, rather fertile, as is revealed by the high figures for exchangeable bases, the rather unusually satisfactory figure (in Terra soils) for total phosphate, the relatively high organic matter content, lower pH and low active $CaCO_3$. However, where they occur as small soil puddles between lapiés the mode of working is problematic, and they are generally rather dry, compact, and difficult to cultivate. Here they are usually left uncultivated, and used for birdcatching and very rough grazing for sheep and goats, or occasionally very patchily for poor crops of cereals, prickly pear, fruits or flowers. The alluvial flats and flatter lands without surface lapiés are by contrast, usually heavily cultivated, bearing a wide variety of crops, especially in the damper valley bottoms, with potatoes most important on the non-alluvial flatlands. Where the land is worked intensively the depth of crumb-structured soil is greater, and in the valley bottoms, especially, the water relations seem to be improved.

The terraced Terra soils, that is, members of the various complexes, are usually very dry, and one of the unfavourable features of the carbonate raw soils, is the higher active calcium carbonate because of the incorporated rock flour.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

They seem to be largely devoted to cereals and potatoes, and in general give relatively poor crops. These soils are in several areas widely abandoned because they are uneconomic to work. 134 311

SOIL NEEDS

The needs of a soil, for the improvement of its fertility, are not simple to assess, and in the Maltese Islands at present they are not known. A fertile soil is considered as one which is in the optimum condition for the growth of crops, and this is dependent on a variety of factors, physical and biological as well as chemical. Air and water must be available, and man by cultivation and irrigation attempts to influence their disposition to favour his crops, just as by using fertilisers and weed or pest killers he attempts to influence the chemistry and biology of the soil.

PHYSICAL NEEDS

A soil which has a poor physical structure may be unable to support good crops, because water cannot be conducted to the plant easily enough, or because the soil aeration is poor. The heavy clay soils of the Fiddien series have poor structure, and it probably is the correlated difficulty of wetting the soil rather than the chemistry of the soil material (which often has a rather high concentration of exchangeable sodium and soluble salts) which causes it to be nearly useless for agriculture.

In the majority of cases the Maltese soils have a reasonably good structure, and the only other soils which appear to be ill-favoured are the heavy-textured soils of the Xaghra series. In this case the subsoil is often very compact indeed, and the separations between structural units are minimal. However, where such soils are well worked, and more particularly where they are irrigated, the structure seems to be much improved, partly no doubt because of the increased and active microfauna. While irrigation is probably difficult to extend, the use of improved cultural practices on these soils would probably produce an increase in the soil organic matter content and improvement of the structure. Among such practices the use of nitrogenous fertilisers, use of improved rotations, encouragement of root growth, avoidance of oxidation of root-derived organic matter through unnecessary turning over of the soil, and the avoidance of pulling cereals as a method of harvesting, might cause considerable improvement. The application of animal manure in irrigation water as already practised locally in Malta also appears to be effective in increasing organic matter content of the soil. 134 242

One of the chief problems of all crops in the Maltese Islands, is water. Certain of the lighter textured soils are extremely dry, and conservation of rainwater rather than extension of irrigation must be the answer because domestic water needs are already difficult to satisfy. Apart from practices designed to diminish evaporation loss, especially early removal of weeds by hoeing, it is probable that increasing the organic matter content would considerably increase the ability of the soil to hold water. But another simple possible method would be to marl some of the lighter soils with the calcareous clay, e.g. Fiddien heavy clay, which is not in agricultural use. (This would in addition possibly make more nutrients available.) 134 [312]

As far as aeration is concerned, it seems unlikely that it is deficient in many soils at present; but use of a rototiller (common in Malta) is believed to decrease aeration, and this could be investigated quite simply. It is possible that an excess of soil CO_2 would be beneficial in calcareous soils, reducing the pH of the soil solution to a level at which there is greater availability of most nutrients; and particularly those, such as phosphorus, which are likely to be deficient.

CHEMICAL NEEDS

Despite some other possible deficiencies it seems likely that nutrient

[TEXT CONTINUES ON P. 97]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Plate V. Northern Malta. Spring.
From top left to bottom right: Bajda Ridge, Wied tal-Pwales, Wardija Upland, Binġemma Basin.

Plate VI. View north from the Citadel, Ġozo. Spring.
Foreground: dissected Globigerina plain. Middle distance: Blue Clay slopes.
Background: Upper Coralline plateaux. (Żebbuġ church, left centre).

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deficiencies are likely to be the most important factor involved in soils of low fertility in the Maltese Islands. However, it is not possible to say immediately what these are because

(1) There is no simple relation between analytical data and availability of nutrients to plants.
(2) Existing analytical data are few and they are not correlated with field crop performance.
(3) Satisfactory chemical data for calcareous soils are more than usually difficult to obtain and compare.

Despite the generally healthy appearance of the crops, some symptoms of nutrient deficiencies have been observed, and remembering well known characteristics of calcareous soils, it is obvious that only experimental comparison of fertiliser application with crop yield, can give any definite answers about needs. Such experiments need to be of a form capable of statistical analysis, to enable tests of significance to be applied and to reveal interactions.

The first step should be to set up a simple series of long term trial plots in sites typical of each soil, using only one crop or rotation and only N, P and K fertilisers, each at two levels. Later, foliar analysis or an 'application to plant' method could be used to examine crops for specific deficiencies in order to make a more complete picture. Again, at a late stage alternative fertilisers might be compared, and time and mode of application, although until new data are obtained it is likely that early application, effective elsewhere, may be beneficial in Malta also.

It should be borne in mind that (1) effects of past management may have upset the natural status of the soil - the addition of town refuse is a case in point, as in addition to actual toxins, the microbial population may be unfavourable. (2) Effects of infestation by parasites and fungi, or diseased remains may remain which will invalidate a trial. This needs strong emphasis since much soil disturbance has taken place in Malta, and the addition of town refuse is common. Further, many plots have been observed to be infested with broomrape, which is never combated, and others to exhibit root damage produced by insect larvae. The elimination of these alone would in any case result in considerable improvement in crops.

The symptoms of deficiencies which have been observed are potash necrosis of fruit tree leaves, and lime induced iron chlorosis of citrus tree leaves, particularly on the xerorendzinas and carbonate raw soils. In addition it is well known that phosphorus fixation takes place rapidly in contact with calcium carbonate, and is most complete when the latter is in a state of fine subdivision (Gonzales Garcia and Tristan Matos, 1956). Thus deficiencies of these nutrients are likely to be discovered by experiment, and although the author has not observed symptoms of nitrogen deficiency, the low organic matter content of the soil, and the lack of conservation of nitrogen make it seem likely that it will be found deficient in some localities. Sulphur, sometimes found lacking in marly soils (like Fiddien series) in Spain, is likely to be found deficient, and although ordinary superphosphate supplies sulphur as well as phosphorus, it seems possible that elemental sulphur as used in Spain may be more effective. Minor nutrients, for example iron, may be supplied by chelates like those used successfully in arid parts of the U.S.A. (Kuykendall et al. 1957), or less expensive spraying methods.

SALINITY

A few soils in Malta are affected by a saline ground water, a few plots are being irrigated with brackish water, and, although this has not been directly observed, probably some are affected by saline spray. The result is an increasing soluble salt content in the lower part of the profile, but up to the present the concentration has not been great enough to cause very noticeable effects on crops, although poor structure is noticeable in two profiles examined. The avoidance of ill effects due to saline waters can be effected by making certain that through-drainage takes place from time to time, in order to carry away some of the dissolved salts. The use of soluble calcium salts in the irrigation

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134 water occasionally is a further aid. This is difficult or impossible, however, without drains and irrigation, so that soils with a saline ground water, are probably irremediable, but they may not in any case be worsening very rapidly.

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[p. 98-A]

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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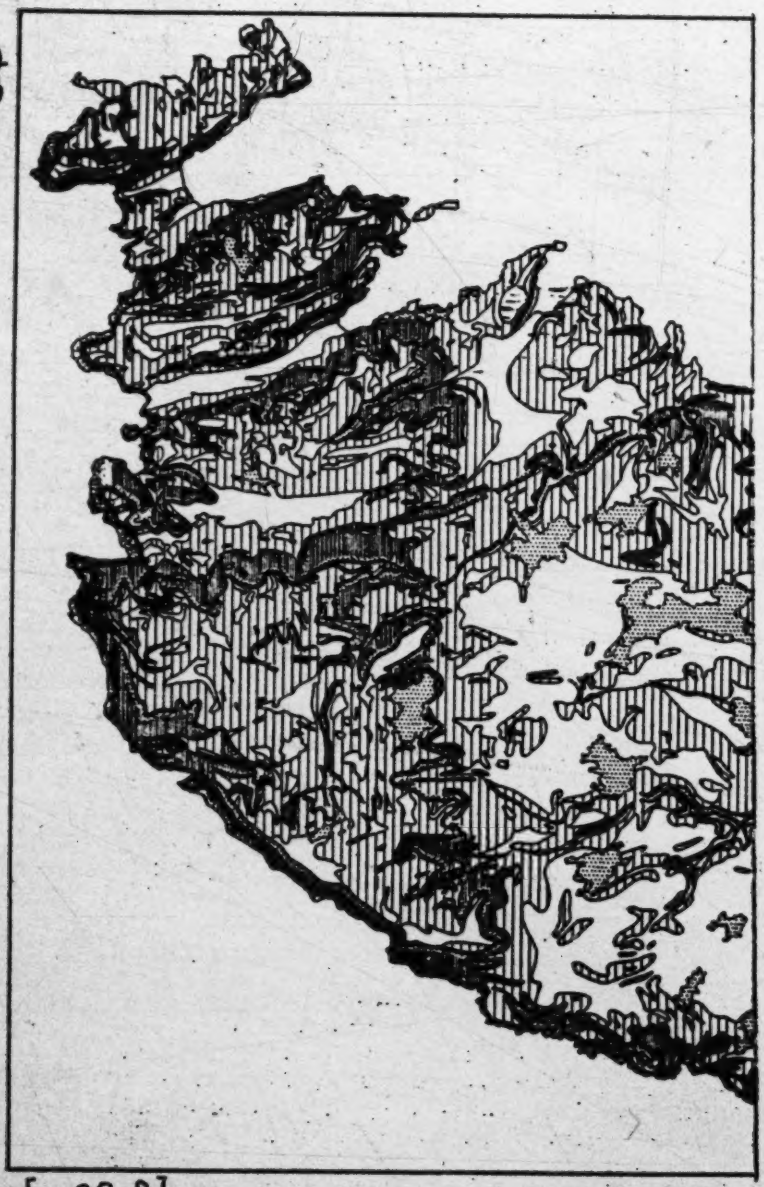

[p. 98-B]

Fig. 28 Steepness of Slope (Malta).

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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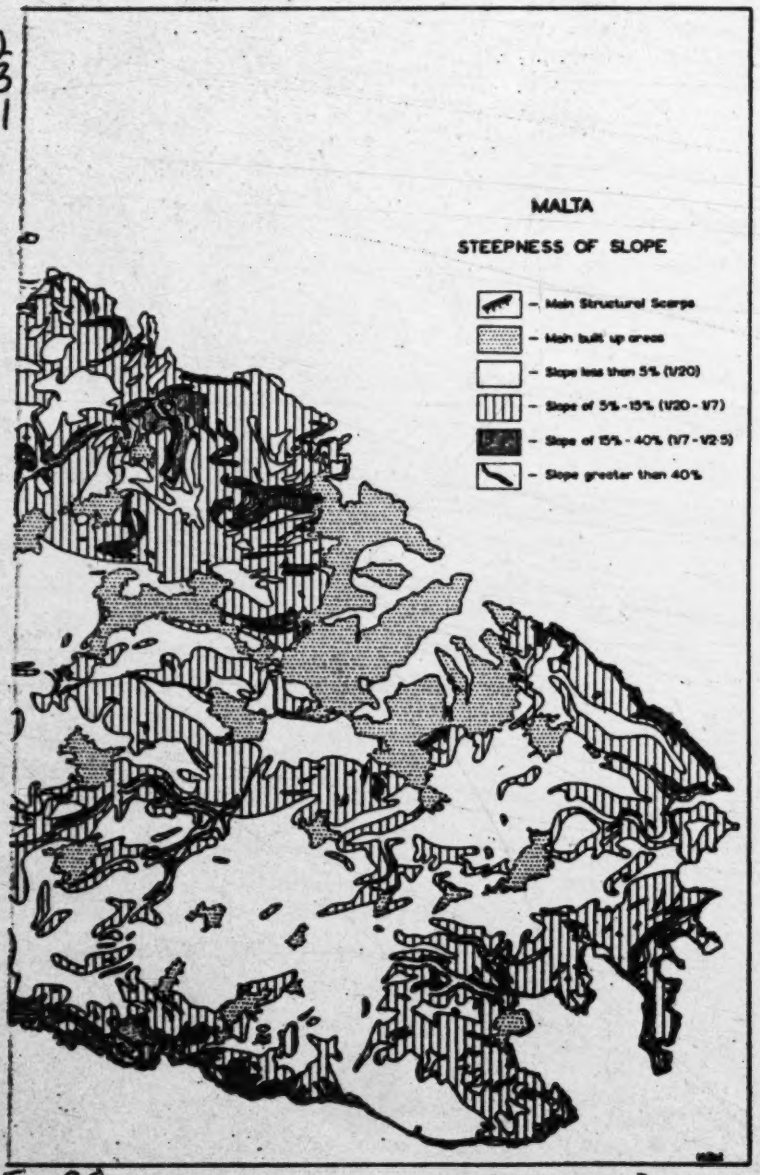

Fig. 28
Steepness of Slope (Malta).

[P. 98-C]

B. Slope Analysis, Erosion and Tillage

The slope map (Fig. 28) is a further illustration of the regional variations in the physical landscape which were described in some detail in Chapter I. The most clearly marked feature is the division into Western Scarplands and Central and Eastern Hills and Plains. In the former, gently sloping land (slopes less than 1 in 20) is confined to basins and to a few very limited parts of the plateau uplands. Sharply accidented topography and thus steep slopes are widely developed in this region, reflecting its complex structure. Slopes of gradients ranging from 1 in 7 to 1 in 2.5 occur along the faulted edges of all the plateau blocks as well as in the zone of Blue Clay outcrops which separates them from the Globigerina lands to the east. The various uplifted blocks themselves generally have undulating summits with slopes between 1 in 20 and 1 in 7. In the Central and Eastern Hills and Plains, the position is reversed. Over these parts of the Island gently sloping land (gradient less than 1 in 20) covers at least half the area and really steep slopes (greater than 1 in 7) are confined to coastal cliffs and a few valley incisions, the latter case being particularly widespread in the Naxxar-Gharghur hills.

There is, however, no simple correlation between steepness of slope and the presence or absence of cultivation. Indeed, the greater proportion of the land shown on the map as having a gradient greater than 1 in 7 is in fact still under the plough. The distribution of waste and abandoned land, occurring on plateau summit rather than scarp face, is a function of rock-type, exposure and various social and economic factors (see p. 227) rather than of gradient. That gradient only in extreme cases sets absolute limits to the extent of cultivation is illustrated by the Rdum zone of the south-west coast where, in the Rdum ta'Dingli and the Rdum tal-Lunzjata, intensive cultivation is maintained in land whose average gradient is greater than 1 in 2.5.

Though gradient has little direct effect on the pattern of farmland and waste, it obviously has much to do with the physical effort involved in maintaining a particular piece of land in cultivation. Even here, the control is by no means absolute. The problems of retaining a soil cover are much less serious in steeply sloping districts where thick, heavy soils are derived from the Blue Clay, than in areas of similar gradient where the parent rock is of Globigerina or Coralline Limestone. In the latter case, soils are thin and coarse, *'campi artificiale'* are frequently found and the soil, once removed, is not easily replaced either by natural or by human agencies.

The character of field boundaries illustrates this point. In Blue Clay areas they are generally low ramps rather than retaining walls, whereas in steeply sloping limestone areas, walls of great height and thickness are necessary to maintain a rudimentary soil cover. Field shape and size (see Fig. 68 and p.185) are also relevant. Long, narrow, ribbon-like fields are characteristic of steep slopes in limestone districts, while in Blue Clay areas fields are generally much larger, despite steep gradients.

The dangers consequent upon careless tillage and failure to maintain boundary walls are greatest on slopes steeper than 1 in 7, in areas where the soil cover is thin and is either artificial or derived from limestone rocks. The abandonment or neglect of a single field, the breaking down of a single wall quickly lead, in such areas, to damage above and below the neglected field and may eventually affect a whole flight of terraces, even driving away other cultivators who are unable to bear any increased load of maintenance work on their walls and fields. While outstandingly heavy storms can cause damage to land of all types (see p. 67), in areas falling within the category indicated above, constant vigilance is necessary at all times, both in the use of traditional methods of tillage and particularly in the introduction of new ones.

[P. 99]

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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SECTION 2

THE PEOPLE

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Plate VII. Upper Coralline Plateau.
"Cart ruts" on karstic wasteland. Man-made fields, some now abandoned, superimposed.

Plate VIII. Ġgantija.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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[P.103]

Chapter IV

MALTA BEFORE A.D. 1800

A. Malta before the Knights

The Maltese Islands were probably first settled towards the end of the third millenium B.C.; certainly there is no evidence of any earlier occupation. From this time onwards, the landscape has had stamped upon it the successive imprints of a series of cultures and culture-contacts. This is not the place to attempt a detailed analytical history, but any study of a region and its people must consider time as well as place. In Malta we have, in the course of our fieldwork, continually felt an extraordinarily strong sense of continuity, an existence that much which is contemporary can only be understood in terms of the past, and often of the remote past. Conversely, a close examination of the landscape can help to illuminate the past in a strictly historical sense.

The sort of question which arises in an investigation of the rural landscape may be exemplified by the much-debated problem of 'cart-ruts'. On some of the expanses of bare rock which exist in various parts of the island of Malta are deeply incised grooves, in dual and parallel alignment, sometimes in isolation, often in complex 'tramway' patterns (Plate VII). Various attempts have been made to explain them (1) but with little success. We are certain only of their approximate age. To the prehistorian they are of obvious direct interest. To ourselves they are irritatingly fascinating because of the indirect and obscure evidence which they seem to offer of the nature of the processes which have operated on the land of Malta. Were they friction-incised through a soil cover by skid-carts? If this is so, then the soil cover must not only have been more extensive than at present but must also have evolved under different climatic and edaphic conditions from those with which we are now familiar. What can we deduce from the present limited exposure of the ruts and from the fact that often they appear to have been blotted out by cultivation? The traditional answer, as put forward by Zammit (2), is that they carried sledges for the collection and transport of soil so that man could concentrate the soil in field plots. Thus field-making inevitably covered the ruts except on the ridges and bluffs. There are defects in these and other explanations, none of which come near to helping us to estimate the number and kind of people involved.

The settlements, too, present problems. Thus the archaeologist: 'The curious and complete absence of settlement-sites throughout the prehistoric period, which also holds good for the Punic and later periods, seems susceptible of only one explanation. The best sites must have been chosen for settlement very early in the islands' occupation and these have remained centres of habitation until the present day' (3). May we then assume that, with the exception of the 'lost villages' of more recent times, the settlement pattern of today results from continual addition to, and an absence of erasures from the palimpsest? The answer is not only of chronological interest but has an essential place in any analysis of present-day Malta.

For such reasons as these we have attempted in this section to give a time perspective to the Maltese picture in order to help our present understanding.

The first Maltese would seem to have been Neolithic farmers using impressed ceramic ware of a type associated with the *Stentinello* culture of eastern Sicily. The stylistically earliest wares of Ghar Dalam (I) (Fig. 29) are associated with megalithic temples already well enough developed to have lost their original tomb character and to have become cult centres. These and later temples, built during the eight centuries before *c.* 1800 B.C. (Period I), are impressive and surviving contributions to the landscape by the first Neolithic people. Megalithic rock-tombs have been found at Xemxija and probably from this type of structure there evolved five distinct and successive phases of temple architecture. The earliest are those of Mġarr (II) and Xewkija (III) with a simple

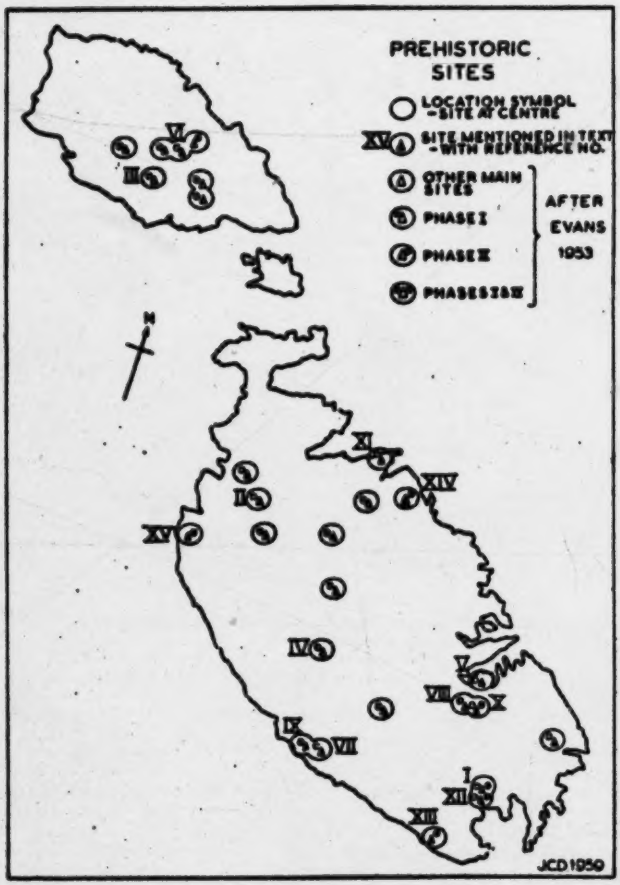

Fig. 20 Prehistoric Sites.

clover-leaf plan of shrine and forecourts, associated with 'cut-out' styled ware also with *Stentinello* affiliations. By a little after 2000 B.C., a late Mgarr temple type had evolved contemporaneously with pottery of a more individual style as found in the Żebbug tombs (IV). In the latter, red ochre and flint have also been found, both imported from the Sicily-Lipari region. At Kordin (V) (Corradino), a more highly developed temple was built with embryonic apses opening off the centre court and in G. ao, at Ġgantija (VI), an early gigantic trefoil was further developed in this form (Plate VIII). At Ġgantija and Ħaġar Qim (VII) a penultimate stage foreshadowed the later climacteric. The buildings and individual stones became of immense size and, for the first time, the softer

Globigerina stone was used for the interior walls while the exterior remained of Upper Coralline. The Globigerina slabs were finely dressed and show the beginnings of ornamentation which was already being exuberantly applied to pigmented wares. Piggott (4) has maintained that, in this fourth phase of temple-building, in ceramic development and in the Hal Saflieni Hypogeum (VIII) (an underground ossuary), the Maltese tradition achieved its most characteristic individuality. Finely-worked flints and shell ornaments, known since the Żebbuġ phase, continued in use. The simple representational art in clay and bone, characteristic of the earliest period, evolved through the 'Statue-Menhir' of Żebbuġ to the fine figurines of this penultimate period (5). The 'scratched' decoration, so different from the painted wares of the Aegean entering Sicily, in particular emphasise the 'mysterious isolation and insularity' of Malta during this period. Evans (6) suggests that 'The Islands remained, as they were to do once more when the Greeks colonised the same areas of Sicily a millenium later, unaffected by this movement of Aegean peoples'.

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At some time between 1700 and 1500 B.C. this culture, which had become indigenously rooted, reached its final flowering as a result of contacts with Cycladic and Mycenean cultures. The Mnajdra temple (IX) and those of Tarxien (X), the finest parts of the underground hypogeum at Hal Saflieni, together with important but lesser works such as those at Bugibba (XI) reflect high aesthetic standards, great technical skill and considerable wealth. Spirally carved decorations, animal friezes in low relief and sophisticated modelling and sculpture embellished the shrines of an unknown religion. 'The finesse, the elaboration and sophistication... reflect a correspondingly unique development of ritual and liturgy... There are hints of divination and of oracular chambers, as well as the practice of ritual sleeping... to obtain visions; and the litter of broken pottery must come from offering bowls and the like; there are the statues of the mother-goddess. For 500 years at least, in the early second millenium B.C., Malta and Gozo must have counted as the most magic and potent island sanctuaries of the central Mediterranean world' (7).

As we have already noted, the settlements of these life-death worshippers have not been found and we can only assume that most of them must lie beneath the inhabited 'tells' of today. The early wares and the temples suggest for these people a remote origin in Western Asia. We know that, although some metal tools may have been used at a late date, they depended mainly on imported flint and obsidian and on local chert for implement making. The size and complexity of their shrines suggest that there must have been a large group of specialist masons and builders. These could have been supported either by an improbably numerous population capable of agricultural productivity of an unique intensity for the period or because Malta, even then, was the recipient of outside wealth. These early inhabitants wove cloth, carved in bone and ivory and practised inhumation and collective ossuary burial. Quite suddenly, about 1500 B.C., this culture, of which we know so little, was swept away by invaders.

Probably from southern Italy, possibly before that from Greece and Asia Minor, came a second culture and a people in all respects alien to the Period I settlers. Our knowledge of them is even more fragmentary than of their predecessors. The old cult centres and temples were generally ignored but that of Tarxien became a cremation cemetery, while Borġ in-Nadur (XII) became a fortified settlement site. In a cairn at Wied Moqbal (XIII) and in several small dolmens, as at ta'Hammut (XIV) pebble-burnished coarse slipware of the Tarxien Cemetery type has also been found. Metal objects, tools and weapons attest to the metal-using character of the newcomers. Before they became properly established, a second wave of kindred people would seem to have conquered the Islands. Borġ in-Nadur was re-occupied and strengthened as a fortress. The people of Period IIB possessed copper and bronze and, like their predecessors, looms of a primitive sort.

The final phase of Period II is represented by finds from the settlement site at Bahrija (XV) which suggests South Italian Iron Age influence on an indigenously rooted culture. Probably between 1300 and 800 B.C. the cart ruts made their first appearance, while rock tombs of the period are still being found in pro-

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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fusion. Like their predecessors, the temple-builders, the Maltese of Period II represent one cul-de-sac ending 'of a gradual and infinitely complex movement of people and cultural elements from the Eastern to the Central Mediterranean' (8). The culture of Period I was probably erased in all forms but the monumental; the second probably persisted until Semitic contact was made with the Islands some time between the eighth and sixth centuries B.C.

Much has been speculated, though remarkably little is known, concerning the Phoenicians in Malta. As evidence one can only offer a few inscriptions found in various parts of the island, and characteristically Punic forms of burial which seem to have persisted down to the Roman occupation. The Phoenicians were once given credit for the great megalithic monuments and, until recently, it was fashionable to give them credit for the Maltese language as well. During the last 40 years, archaeological, linguistic and, to some extent, anthropometric advances in knowledge have changed the picture. Phoenicians and, later, Carthaginians may have come as traders but it is difficult to imagine that the Islands could have been anything more than transit points on shipping routes. Semitic settlers and administrators may have imposed an organised domination over Malta and Gozo: Mdina at least has produced pottery of Period I, Period II, Punic, Roman and later styles and, as already noted, Punic type rock tombs are numerous. Nevertheless, during the period of Greco-Punic rivalry in the Central Mediterranean, there is no certain Greek reference to Malta, whereas accounts such as that of Thucydides (Book VI) give detailed statements of all the important points held by 'the enemy'. Linguistically it may be feasible to consider that the Semitic structure and content of the Maltese language may have pre-Islamic elements but it is neither correct nor necessary to invoke a Punic conquest to account for this. The anthropological work of Buxton and Bradley (9) has but limited general value because of the difficulty of dating the prehistoric human remains (largely cranial). Even so, there is no supporting evidence for a Phoenician and/or Carthaginian colonisation.

All we know for certain is that, during the second century B.C., Rome, triumphant over Carthage, assumed political control in the Maltese Islands. The Islands were made part of the Praetorship of Sicily and, later, first Malta, and then Gozo were given 'Municipium' status. Direct evidence of conditions in Malta even during this, the first historical period, is fragmentary. Strabo mentions Malta and Gozo in terms of position, Livy and Ovid are scarcely more helpful. Cicero is a little more illuminating in his oration against Varres, once Praetor of Sicily, who was accused of abusing his position: '... what could you want with so much Maltese cloth, as if you were going to dress all your friends' wives?' Diodorus Siculus records that 'Melite' possessed many 'harbours', that its artisans were cunning weavers of linen and that the houses were architecturally worthy of note. He also believed that Malta was a Punic-planted colony and was already accruing wealth from sea trade. The Bible tells us nothing beyond the fact that St. Paul was shipwrecked on 'Melita' in A.D. 60 and spent some time thereafter in the island.

Archaeological evidence is scarcely more helpful, limited as it is to a few inscriptions, coins and parts of buildings in pre-existing settlements such as Rabat and Żurrieq. What we do know of the Roman period is, however, of some importance. It seems likely that Malta had long lain on the orbital fringe of a Siculo-Aegean culture zone and had probably been affected by Mycenean and Punic contacts. Henceforth, with one short break, the Islands occupied a place in the political and cultural organisation first of Rome and Byzantium and then of Christendom. For some five centuries, it seems reasonably to assume, the Maltese Islands were an organic part of Roman town-centred civilisation. After the Gothic and Vandal irruptions broke the unity of the Western Mediterranean the Justinian reconquest of Sicily may have included Malta or may merely have improved the regional stability around an isolated outpost of Roman culture in Malta. Again we do not know. During the long decline of Rome and the new territorial adjustments which preceded the rise of Islam, there is no direct evidence but only conjecture on the fate of Malta.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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During the latter half of the ninth century A.D., we believe that the Islamic conquest of Sicily extended over Malta and for just over two centuries, the Islands came under non-European rule. This period is yet another element of the Maltese past which today appears fraught with significance but which remains maddeningly obscure. The material evidence of what may be termed the Arab era is limited to parts of the fortifications of Sant Angiu (Birgu), the Grand Harbour and of Mdina, the *Medina* and capital of the Muslim rulers. The cultural and linguistic evidence is more abundant but its significance is also less certain. The census of households taken in 1240 (see p. 135) listed 771 Muslim as against 350 Christian families but what does this really imply? We can only hazard a guess as to the numerical accuracy of the count and, since we do not know for what purpose it was made, we cannot assess the meaning of 'Muslim family' in this context. In Malta today the townsman, who speaks a language basically Semitic, will often, rightly, insist on his post-Arab, European origin, yet in the country a farmer, speaking a language almost Arabic in content as well as Semitic in structure, may in all humility describe himself as 'GHarab'. We are left with speculation. Was Malta intensively Arabised? There is no evidence of religious persecution during this period and, although this is a dangerous argument, there seems little enough reason for Arab interest in the Islands to have been particularly strong. It may be that the Maltese were already sufficiently Semitic in language and cultural background easily to be overwhelmed by this last incursion from the East. Was the Roman and Christian overlay so thin as to allow something older and alien to Europe to break through? Even today, the horns of fertility appear side by side with Christian symbols. At all events, by 1090 and the Norman conquest of Malta, the Islands had become sufficiently non-European to retain a much stronger impress of the East than did even Sicily.

With the arrival of the Normans in Malta, less than 30 years after their occupation of England, Malta was rescued for Christendom to become one of the outposts and bulwarks of European culture. By the time of Roger II's assumption of the title of King of the Sicilies in 1130, the Christian Cathedral had been built at Mdina and the line of Island Bishops re-established. Until 1268, Malta and Gozo formed part of an Italo-Sicilian political unit, as a fief of the Grand Admiral of Sicily under the Norman crown from 1193 to 1194, and then under Swabian rulers. Presumably some form of feudal social and political organisation made an embryonic appearance but here once more we have practically no evidence. Indeed, although some late records do exist, no real study has yet been made of the social and economic basis of feudal life and landholding for any pre-nineteenth century period of Maltese history. There is mention of Malta as a *commune* in 1208 (10) and in 1274 the *Consiglio Popolare dell Universita* is recorded as protesting to Charles of Anjou, the contemporary ruler, over the violation of ancient rights (10).

In 1282, Aragonese rule was accepted by Sicily and in 1283 Malta also passed under Iberian control. The Islands remained associated with Sicily for administrative purposes and would seem to have been farmed out in parts as fiefs to members of the Aragonese and Sicilian nobility. At this time, too, the first noble titles were conferred on the indigenous aristocracy, beginning with that of Baron of Diar il-Bniet in 1350 (11). Otherwise, little is known except that the religious orders were early established and that the Church must at this time have secured its firm place in Maltese life. Arab corsairs continued to attack and plunder and to be attacked in their turn by Sicilian and Maltese ships. The population cannot have been numerous and we must assume that it was concentrated in large villages in the centres of the Islands. At Citta Notabile (the old Mdina) (Plate IX), and at Gozitan Rabat (Plate X), the citadels were flanked by the houses of the magnates. There is no record of trade or manufacture.

Thus, until A.D. 1530, Malta existed feudally in relative stagnation, its isolation broken only by the alarms and excursions of sea-borne attack. In 1453, 23 years after their capture of Constantinople, the Ottoman Turks made their first recorded raid on Malta and the Islands entered a new phase of their history. In 1524, the Order of the Hospitallers of St. John of Jerusalem sent a

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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174 Commission to report on the state of the Islands. This report is no longer extant, but we may with caution use later writers' conflations (12) as evidence of the character of Maltese life in the period immediately before the coming of the Knights. Briefly, we can summarise as follows: Malta was described as 'a mere rock' inadequately covered with soil. The main products were honey, cotton and cumin, which the inhabitants exchanged for corn. Of water and timber there was a perpetual scarcity. Città Notabile was largely uninhabited and there were no settlements to be found on either the inhospitable northern littoral or the open bays and spacious harbours of the east. The island, with its 12,000 inhabitants, was frequently raided by corsairs who further increased the misery of the unfortunates subsisting on the barren soil. Gozo was described as being more fertile, with a population of some 5,000. The smaller island had no port and even the fine natural harbours of Malta were inadequately fortified. Much of Birgu (later Vittoriosa) lay in ruins. Even allowing for some prejudice on the part of the Knights' reconnaissance party it remains a forbidding picture.

The character of the pre-sixteenth century buildings is one manifest expression of the indigenous life which had developed (13). Churches were either of troglodytic form as at Mnida and Mellieha, or small, rectangular buildings with pitched roofs of a type still surviving today. Some old village houses or farmsteads still retain their ancient characteristics. In most cases, large double doors open on to inner courtyards on which in turn open all the windows and doors of the single-storeyed house and storerooms. Life was centred in the courts and turned its back on the rest of the world in blind defensive walls. In villages such as Żejtun, the old streets are narrow and tortuous and some old houses have but small, single doors. The town houses of the nobility and gentry became more architecturally developed during the fifteenth century and later, but only in the security offered by the citadels and larger 'casals'. The exuberance of building which followed the coming of the Knights might be figuratively taken to represent a great freeing of the Islands from insecurity in isolation. Henceforth Malta might be besieged but at least it would be as a bastion, not as a lonely fort.

How much of the traditional experience of Maltese early history has survived into recent times must be largely a matter for speculation. All we may say here is that, for over 3,000 years, all the forces and currents which make up Mediterranean history have at least impinged on Malta. Each has left something in the landscape and, it is tempting to believe, in the traditional experience of the people.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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MALTA A.D.1530 to A.D.1800

B. Malta of the Knights

Malta had become a mere pawn in feudal and state power-politics and its people, high and low, were not consulted when, in 1523, Emperor Charles V, King Charles I of the Spains and inheritor of the Aragonese Mediterranean empire, offered the Islands to the Military Order of Hospitallers. 175*

The Order of St. John had its beginnings during the first Crusades. The Hospitallers were originally soldier-monks concerned primarily with the protection and welfare of pilgrims to the Holy Land. In addition to its duties of maintaining hospices and tending the Christian sick the Order, by the time of Papal charter recognition in 1113, had become involved in the military struggle against Islam. During the twelfth and thirteenth centuries the Crusader Christian Kingdoms of the Levant, established with such effort, finally succumbed to internal weakness and external pressure. In 1291, the Hospitallers left the Holy Land for Cyprus and in 1309 moved to Rhodes to carry on the Crusading struggle as an island garrison. In their new base in Rhodes, the Order of St. John developed a fresh constitutional form and a new *raison d'être*, both of which were to survive for almost 500 years. The Knights of a now quasi-sovereign order retained their old vows of chastity, poverty and obedience and they extended their chain of hospitals and chapels throughout the Eastern Mediterranean. Nevetheless, as their military garrison characteristics became emphasised by the growing and threatening Ottoman strength and as the Knights added naval techniques to their armoury, so an organisational hierarchy of a secular type developed. They came to be grouped, on the basis of nationality, in eight *Langues;* those of Auvergne, Provence, France, Aragon, Castile, Italy, Germany and England. To each *Langue*, under its 'Pilier', was entrusted some part of the defence and organisation of the Order.

Two of the three classes of Knights were of noble descent. As in Palestinian days, the premier Knights of Justice, who elected the head of the Order, were only admitted from the many noble applicants after exhaustive investigation of their character and lineage. The second class, that of Chaplains, was particularly prominent in religious affairs as well as having normal military duties. Here, too, noble birth and standing were essential but the criteria were less exacting. Last came the Servants-at-Arms who, although of respectable rather than of aristocratic lineage, were still rigorously selected. Thus, in Rhodes, was finally established, in legitimate circumstances, the class structure and the exclusiveness which always thereafter characterised the Knights in all their dealings.

The Order itself, which for so long was to be a successful bastion against Islam, was not numerically strong. An account of 1631 (14) shows a strength of 1,755 Knights, 148 Chaplains and 155 Servants-at-Arms. In Rhodes, and later in Malta, local recruitment of sailors and soldiers swelled these numbers but the fighting power of the Order was essentially a matter of organisation and individual quality. Here lay the secret of the Knights' successes in the militant period of their history, and also the reason for a tendency towards segregation away from the populace. The fighting machine was to some extent supported by the capture of infidel treasure and by trade but the real wealth accrued from the European estates of the Order. Pious grants, political acquisition and inheritance brought to the Order farmland, castles and town dues, the administration of which was organised in 'Commanderies'. As a natural result of the preponderance of the French *Langues*, most of the 656 Commanderies which existed in the early sixteenth century were situated in the Kingdom of France, with dire results in the eighteenth century. Through the Knight and Chaplain administrators came regular tithe-like incomes and extraordinary levies for the requirements of the Order and its territorial bases. Thus already, in Rhodes, appeared a fully-fledged temporal power dependent on external wealth, the introduction of which into Malta was vitally to affect the Islands' way of life.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*195 In 1522, Turkish power, which had already advanced into Europe during the fourteenth century, proved too strong for the garrison of Rhodes. The valour of the Knights won them honourable surrender terms, and the inviolate Order together with its archives and treasure and accompanied by great numbers of the local people left that island. For eight years, Grand Master de L'Isle Adam sought a home and a base for a still militant Order, which was already something of an anachronism in a new Europe of nation-states and in a world less concerned with Mediterranean affairs than was the case before the great age of discovery. In 1523, as already mentioned, Charles V offered Malta as a possible base, but not until 1530 were the various political and military conditions more or less satisfactorily arranged. As we have seen, the Knights' reconnaissance party in 1524 viewed the Maltese Islands with repugnance so different were they from large and fertile Rhodes. However, there was no choice, and in 1530 the fleet of the Order sailed into Birgu harbour.

In Malta, the arrival of the Knights caused consternation among the indigenous nobility of Notabile. This blended Maltese-Sicilian-Spanish aristocracy had much to lose in status and sent envoys to plead with the Viceroy of Sicily. The Order could obviously not allow any rival government to hamper its specialised organisation for war and local administration was merged with its own. Neither did the Church and Religious Orders already established greet the Knights, with their especially favoured Papal status, with any joy. It seems unlikely that the peasantry of the inland villages had any particular reaction; their wishes, whatever they might have been, were in any case of little or no account. Thus began a state of affairs which continues to the present day in which Malta is inhabited by divided societies, farmers and town dwellers, a garrison and the indigenes, where parochial affairs are faced by cosmopolitan ideas. Even today, the nature and the roots of developing cleavages between communities must be understood before either the present situation can be appreciated or the future prognosticated.

Much has been written concerning the sojourn of the Order of St. John in the Maltese Islands (15). We must confine further attention to a few of the most relevant aspects of Knightly rule. First and most obvious is the military and strategic role of the Order.

Scarcely had the Knights arrived in Malta when the still expanding power of the Turks attempted once more to engulf them. During the 1540's, the new Islamic empire continued its conquering advance north of the Danube into Hungary and Transylvania. In 1551 eastern Tripolitania fell and in the same year Gozo was savagely attacked and its population reduced to about one-third of its former size. In 1560 the Knights were obliged to retreat from Tripoli itself, with the defence of which they had been saddled by Charles V. In 1565 the main attack on Malta was launched by Dragut Reis and there ensued the Great Siege, the memory of which is perpetuated still in a National Day. At this time the Order occupied the old port of Birgu and its small fleet of galleys and supply ships lay in what is now Dockyard Creek. It is worth emphasising here that the main expanses of the Grand Harbour and Marsamxett were too large and exposed for early shipping and it was the small subsidiary inlets which were the attractive, usable harbours. The main Turkish attack came overland from the south-eastern coves and beaches which the Commissioners of the Knights had earlier noted. From landward and from the sea the small fort of St. Elmo on the point of barren Xibberas peninsula was overwhelmed leaving only the Sant Angiu fortress in Birgu. Here the Knights resisted assault after assault until the weakened Turks retired before the threat of Christian reinforcements from Sicily.

The victors, under Grand Master de la Vallette, turned to the tasks of recovery. From his insistent realisation of the tactical importance of the Xibberas peninsula, commanding as it did not only some of the creeks but also the entry to the main harbour basins on either side, came the re-siting of the headquarters of the Order. The building of Valletta was begun with all expedition in spite of misgivings concerning the scale of work involved. First the fortifications of St. Elmo and the garrison living quarters then the Hospital were

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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constructed. The Auberges themselves, the hostels of the several Langues, were commenced and around these and the new Cathedral of St. John there took shape the regular grid pattern preserved to the present day. The Battle of Lepanto in 1571 gave the Order a respite from the expected Turkish attacks; no respite from financial pressure could take place. From 1566 until the expulsion of the Order in 1798, an immense amount of treasure and labour went into the building of more and more grandiose fortifications. The architectural history of Malta is a fascinating theme in itself and has been treated, in general and in particular, by many writers (16).

The major elements, rather than the details, are more relevant in this context. First, Valletta itself was never conceived as a port city. The Knights attempted to excavate a basin for their galleys at the Mandraġġ but this was too much for even their energies. The war-galleys were either moored alongside the peninsula or remained with the civil shipping in the creeks. The true ports either grew around the old nuclei of the Three Cities to the east, Birgu, Bormla and Isla, or slowly spread along the shores of Marsa, Marsamxett and Gżira. Thus around Valletta there slowly developed a complex conurbation of small units, the embryo 'urbs' of the great urban area of nineteenth and twentieth century Malta. Maltese Mdina, which had become the Città Notabile, now fell to second place as the Città Vecchia, the Old City, her Cathedral, rebuilt after accidental destruction, becoming a co-cathedral with that of Valletta.

Secondly, the sheer scale of the building effort of the Knights remains, even by modern standards, quite extraordinary. Decade after decade, Papal, Imperial and Royal treasure and architects were, often reluctantly, put at the Order's disposal for the construction of fortifications which were never put to the test (Plate XI). That this occurred resulted from the very real naval services rendered by the Order. Throughout the seventeenth century, the Order could very rightly be described as being 'the eye of Europe, the keystone of Christianity, the right arm of the Church, the nerve of our confidence, the terror of Asia and Africa, heroes who make the sea their battlefield' (17). The records of the votive Chapel in the Church of Żabbar attest to the accuracy of this description. Even during the eighteenth century, when Knightly vows were more and more forgotten in an age of decadence which Schermerhorn referred to as 'the era of wigpowder and curls' (18), speakers in the Marseilles Chamber of Commerce could, in 1790, defend the Order as a useful, even necessary safeguard against piracy (19). However irritating might be the sovereign pretensions of the Grand Masters, however politically embarrassing they could become particularly over matters of protocol, and however scandalous might be the conduct of some Knights, the rulers of Europe until, the very last were always ultimately prepared to add by subvention to the Order's normal income from loot and the Commanderies. Malta as a whole one feels became accustomed, even then, to large scale works and constructional employment on them without ever realising the degree of involvement in power politics which was implied.

The third relevant aspect of the Knights' architectural legacy is social in character and leads on to a consideration of the social and economic impact of the Order on Maltese life. The peasant population consisted of subsistence farmers depending on their holdings for all but very few of their requirements. Even in 1958, the story was heard at Għarb of the almost legendary Gozitan farmer of a century ago who spent sixpence per annum - threepence on paraffin and threepence on having his donkey shod. In rural Malta, until very recently, a true money economy had not developed. Much of the technical ignorance which is only now being dispelled in the countryside arises from the long isolation of the farming community. It seems probable, for instance, that the Knights and their entourage depended on imports for high quality products of food and wine and only recently has a fastidious Maltese market for these commodities increased in size sufficiently to make correspondingly large demands on local expertise. The absence of social and economic contact between the Order and the Maltese is corroborated by the scale and function of their building. Away from the main fortified centres there arose watch towers and palaces. The former, which still stand guard around the coasts, are exotic elements in the

[See P. 132— Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*1975 rural landscape, mere reminders of the Order's main and specialised function. The palaces, such as those of Verdala in Buskett, Selmun and Sant Anton, were self-contained retreats for high officials and only in very recent years have some of them been partially opened to the public. In Valletta, the Three Cities and Città Vecchia, the indigenous aristocracy and the Order's upper class followers built great townhouses, the *Case*, after Italian styles. In the villages, the churches and a few houses indicate an infiltration of sophisticated taste (Plate XII), but the village priests remained largely rural in outlook, while a true country-living squirearchy never appeared.

This is not to say that the Order ignored the people over whom it ruled. The Hospitaller tradition was not forgotten. After the move to Valletta was built the Sacra Infermaria, much of which still stands. The hospital and the nursing organisation were advanced for the period and had a high reputation beyond Malta. During the 1620's (20), the cost of maintaining the hospital was equivalent to about two-thirds of the expenditure on the Auberges. A century after the report of an Apostolic Visitor in 1575 (21), a school of Anatomy, Chirurgy and Medicine was founded, and a free medical service was maintained until 1800. Nevertheless, the hospital, the school and the five medical practitioners only served Valletta and the Three Cities and were essentially designed to improve, directly and indirectly, the fighting efficiency of the Order. Educational facilities were with one exception, that of the *Università*'s school at Città Vecchia, provided by the Church. Even here, the Order's preoccupation with their own headquarters is evidenced. The first Jesuit College, built between 1597 and 1602, was the subjection of dissension between the Bishop, who wanted it in the Old City, and the Order who favoured Valletta. This College, with the addition of faculties of Law and Medicine, became the University a year after Grand Master de Pinto expelled the Society of Jesus and confiscated its estates in 1768.

It would be fatuous to criticise the Order for not doing more, either in the way of welfare or of making more social contact with the masses. What the cumulative evidence does suggest is that the Order never identified itself with Malta. Decade by decade, for 270 years, it lived its own specialised life, becoming more and more anachronistic in the new Europe that was emerging. The economy of the Islands, if it is permissible to use the term to describe such a peculiar complex, as well as the society, become imperceptibly changed and distorted, not deliberately but incidentally to the life of the Order. A tradition grew of service rather than manufacture, of an absent-minded paternalism and of reliance on remote, extra-territorial wealth. The *Consiglio Popolare dell' Università*, which was retained in name, became a *massa frumentaria* by which imported grain was bought in bulk and sold at controlled prices. Thus an old local administrative assembly became a means of avoiding discontent among the populace but also resulted in a precocious removal of Maltese prices from the influence of commercial fluctuations. A small number of Maltese, either noble or wealthy, became associated with the cosmopolitan anational life of the Knights. For the remainder, behind the 'Stone Curtain' of forts and palaces, parochial isolation remained undisturbed. Two nations and a garrison lived their own lives. As noted by Aquilina (22) the linguistic cleavages strikingly illustrate the internal dichotomy. The Three Cities of Birgu, Isla, and Bormla became, to the upper classes, Vittoriosa, Senglea and Cospicua. (The last, ironically enough, has now been given a Maltese spelling: Kospikwa.)

Much of what has been said would be applicable to the first century of British rule, but the basis of the present class-conscious and heterogeneous life of Malta was laid by the Knights. Today English loan-words simultaneously enrich and contaminate the language. Even before 1800, Semitic Maltese in all its purity was left to the farmers, while Valletta used a Romance-modified tongue and the literate wrote in anything but Maltese.

Such are the themes of the history of the Order in Malta. The Order busied itself with its own political and economic affairs. The secular peak of centralised government was reached during de Pinto's long reign, between 1741 and 1773, but internal weaknesses were appearing (23). Grand Master Perellos (1695-1720) had his own image stamped on the coinage of the Order and destroyed the

*[See P. 132 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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last remnants of the power of the *Giurati*, the Maltese Civil Magistrates, but at the same time revived the nominal ceremony of receiving the keys of Città Vecchia from the same body. In 1749, the Moslem slaves of the Order made an unsuccessful revolt. De Pinto and his successor, de Rohan (1775-1797) bestowed numerous titles of nobility and of the 26 Maltese title-holders of today 12 derive their status from these two Grand Masters. Ximenes abolished the essential *Consiglio Popolare* (as distinct from the *Università*) in 1775. Diplomacy and court appearances in the capitals of Europe consumed more treasure than the *corsos*, the raids against the Infidel, brought in. Indeed, some of the seafaring exploits were essentially piratical in nature.

Insolvency, dissension and an absence of purpose, together with growing unpopularity in Malta; to these were added the embarrassments of Revolutionary abolition of the Order in France and seizure of the Commanderies in 1792. By 1800, the Malta of the Knights had crumbled under the Napoleonic touch.

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14. Vatican, Barb. Lat. 5036 (quoted by Schermerhorn, Malta of the Knights, p. 195).
15. The best assemblage of material exists in the collections and archives of the Royal Malta Library. See also references in works such as Schermerhorn, op. cit.
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17. DE LISDAM, HENRI: *L'Esclavage du Brave Chevalier Francois de Ventemille*. Lyons, 1608.
18. SCHERMERHORN, E. W.: Malta of the Knights. London, 1929.
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21. CASSAR PULLICINO, J.: Social Aspects of an Apostolic Visit. *Melita Historica*, Vol. II, No. 1, 1956.
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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Plate IX. Mdina. Ramparts and Cathedral.

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Plate X. The Citadel, Rabat, Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Chapter V

MALTA A.D. 1800 to 1914

A. Economy and Trade

During the last years of administration by the Knights, bankruptcy threatened the Order. In so far as one may think in terms of a Maltese 'economy' for that period, one may also note the appearance, even then, of the fundamental economic problems of Malta. During the nineteenth century, a slow change from a considerable dependence on extra-territorially derived wealth to overwhelming reliance upon it made the overall instability of the economy obvious to all. Equally important in many ways, was the growing need for reconciling external economic balance with the claims of a rapidly rising internal demand. This latter problem, now sufficiently familiar to us all, was too novel to be recognised during the nineteenth century. Moreover, in the case of Malta it was, and to some extent still is, obscured by the nature of the invisible income so long drawn from outside.

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At the end of the eighteenth century, Malta drew wealth from two major external sources. Some was derived from visible trade, but: 'the trade of Malta previously to the invasion of the French in the year 1798 was inconsiderable... (it) consisted chiefly in the exportation of cotton twist, the produce and manufacture of the Island' (1). Nevertheless Boisgelin (2) estimated that annual exports of spun cotton to France alone were worth in the same period 2,750,000 *livres*, while Ball (3) in 1801 valued exports of cotton twist and goods at £500,000. These exports, products of indigenous agriculture and manufacture, paid for only a fraction of the Islands' imports. These imports included basic supplies of timber, vegetable oils, simple manufactures and, above all, grain, the domestic production of which supplied only about one-third of the need. Over and above these staple commodities for general consumption were the imports of a great range of superior consumer goods for the Knights and of capital goods for the equipping and maintenance of the Garrison. These were paid for out of the second main source of wealth, the foreign income derived from the Order's mainland estates, from the taxation of the Commanderies, and from special grants by irregularly sympathetic Kingdoms and the Papacy.

A further part of what we may term 'Negotiable Wealth' went to the Order's 'Internal Revenue Account' to pay for administrative costs, for 'contract' services such as fortification building, and also for social and welfare services such as the Hospital, almhouses and medical care (4). This element may be considered in present-day terms to have been expended on the wages and salaries of Maltese employees of the Government and Defence Departments, and therefore indirectly contributed to payments overseas for basic imports. A third but very minor source of 'foreign currency' was that of civil port activity and mercantile profit. Shipping dues made a small contribution, partly in foreign currency, to the Internal Revenue.

Thus, even at this early date, a complex inter-relationship existed between various elements in the Maltese economy. During the whole of the subsequent period the real distinction between the three main elements of the economy, the Internal Revenue Account, the Balance of Payments or Negotiable Income, and the National Product, became greater but unfortunately not fully recognised. The essence of later change lies in the altering relative importance of these main elements and of their constituent parts.

By 1798, the Internal Revenue Account in so far as it can be isolated, was showing weaknesses resulting from increased 'administrative' expenditure. The Balance of Payments was showing a visible annual deficit of 4,000,000 *livres* (5), and this was becoming hard to meet from the income of the Order's non-Maltese estates. The National Product is impossible to assess except in the broadest terms but may be analysed as follows. First there was the production of agri-

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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culture and fishing almost entirely, with the exception of the bulk of the cotton crop, for home consumption in the largely self-sufficient rural community. Secondly, cotton spinning and weaving on a domestic scale which contributed most of the manufacturing production. The third item was made up of wages and mercantile profit on services supplied to the small amount of civilian shipping. A fourth item of rents and profits may be presumed to be very small. Lastly and most important were the peculiar services rendered by the Order to Christian Europe, paid for in foreign income and finally dispersed in wages and salaries for goods and services supplied by the Maltese population, particularly by what we may term the *entourage* of the Garrison.

The last years of the eighteenth century witnessed the complete destruction of the old basis of Internal Revenue and Externally Derived Income, as well as wiping out that part of the National Product which was a consequence of the function of the Order. From 1792 onwards the Knights' estates in France and French-dominated Europe were confiscated and when, in 1798, French forces occupied the Islands, the Order died, in fact if not in name. In 1800, an abject Spain, at the behest of France, prohibited the importation of cotton yarn and in Catalonia the last important Maltese export market was lost.

The period of British occupation and rule which commenced in 1800 was therefore a period in which the existing basic economic situation had to be served by new processes of wealth-getting based on new values. The general economy revived rapidly in embryonically new forms but in the special economic circumstances of the Napoleonic Wars. Between 1800 and 1813 British official expenditure of some £433,000 replaced that part of the Order's foreign income which had been functionally expended. Other compensation came from a relatively new source of foreign income, the personal expenditure of a new type of garrison and a foreign element numbering up to 20,000 at peak. This particular contribution to Malta's need for 'foreign currency' was the germ from which was to grow the greatest single source of Negotiable Wealth. The differential between the value of this type of income derived from outside the Islands and the value of the commodities, increasingly imported in type, set against it, started to become one of the chief elements in National Product as mercantile profit, in Negotiable Wealth - when earned by service industries, and in Internal Revenue through taxation (6).

The decline in the export of cotton was never arrested and the statement in 1812 that cotton twist was a commodity unsaleable abroad was corroborated by time (7). This loss of the second traditional source of foreign income was largely made up by a boom in civil port activity and entrepôt trade. This replacement however implied a further swing towards dependence on external economic activity, and an increase in the proportion of the National Product concerned with services rather than with local material resources.

In 1801 Britain declared Malta a Free Port and, in a series of Orders in Council dating from 1807, the Islands were given an especially favoured status for trading in the Mediterranean. Conceived as strategic economic measures to break the Continental Blockade, these Orders had the incidental effect of stimulating activity at Valletta. Since Napoleon's economic measures were anachronistically mercantilist in operation, and since each addition to the politico-economic confusion, whether the American Embargo Act or war with Turkey, merely intensified the channelling of trade through British maritime controls, Malta flourished. After 1807, the island of Malta became the focal point of a trading system artificially warped and distorted by war. In 1808 two-thirds of cargoes consigned from Malta went to the Levant and Egypt, in 1809 over one-half to Trieste. By 1810 over three-quarters of them were destined for North Adriatic ports and this proportion was maintained for some years. These cargoes consisted almost entirely of British manufactures and Colonial goods. In return, from the Levant came commodities mainly for war-booming London; fruit, oil and wine, fine woods, drugs, carpets, etc. From the Adriatic came raw materials and naval stores such as timber, hemp, pitch and tar, flax, iron, linen, mercury and verdigris as well as glass, wine and tobacco (8). This flood of goods overwhelmed the limited warehouses of Malta and resulted in

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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the springing up of 60 British and over 20 Maltese entrepreneurial businesses. It is not surprising that the Royal Commissioners were able to say in 1812: 'The Commercial part of the Community we found daily increasing in prosperity and opulence; fully sensible of the peculiar advantages derived from the protection of Great Britain; anxious only that this Protection shall on no future occasion be withdrawn' (9). Prophetic words these; from this time onwards, port activity of one sort or another rather than the *corsos* was to be of direct importance.

Internally also there was relative prosperity: 'the great mass and body of the People were happy and contented; warm in their professions of attachment to Great Britain' (10). External boom was associated with internal inflation. Many farmers turned from cotton growing to the production of grain and foodstuffs, the prices of which soared in prosperous Valletta. Many artisans, weavers and spinners found employment in the port services. The decay and near collapse of the old *Universita*, the cheap grain agency, was obscured, except for the very needy, by the short-term benefits following commodity shortages, rising prices and unevenly increased incomes.

From this period onward, in the harbour areas, there developed mercantile enterprises and a large labour force, all concerned with entrepôt trade, with trans-shipping, handling and re-export of almost entirely non-Maltese goods. This port activity began to contribute directly, and on a significant scale, what may be termed foreign currency in the form of commercial profit. Secondly, the payment of tonnage dues almost entirely by foreign shipping introduced a special element of external contribution to the internal Revenue of the Administration. Thirdly, the wages of the civil port labour-force were, directly or indirectly, also derived from non-Maltese sources.

The boom of the Napoleonic Wars, in this sector of the economy, was unstable and short-lived in that it owed its strength to distorted trading conditions. Nevertheless the new entrepreneurs attributed the post-war decline to a British Colonial policy adjudged to be both *laissez faire* and restrictionist in character rather than to the inevitable termination of artificially favourable wartime conditions (11). This point is of importance because throughout the later history of Malta the same error was repeatedly made. Wealth, and in this instance mainly foreign-derived wealth, based on entrepreneurial activity must always be fluctuating in fortune, but it was the booms which were assumed to be the rightful norms while the intervening lower levels of prosperity were regarded as 'outrageous fortune'. One of the tragedies of Malta is that this attitude was strengthened by periodic coincidences of favourable circumstances, and Malta has come to expect such benefits almost as of right. At this early period, we can see too the failure to seize opportunities during periods of prosperity for investment in improved port facilities and in the manufacturing and agricultural sectors.

A post-war decline in externally inflated commerce was accompanied by a drop in direct and indirect Imperial expenditure. Britain had been primarily concerned with the beating of Bonaparte and, with certain strategic and constitutional provisos, was concerned with a return to the *status quo*. The main garrison and fleet departed, leaving behind in 1813 Governor Maitland, his 35 English administrators and a small naval and military force. British economic interest became centred on balancing the Internal Revenue account. The Treasury was in a parlous state and the *Universita* heavily in debt. The Government Revenue Account was soon put on a sound basis but the loss of much external wealth severely affected the Islands' population. The fall in commercial and urban prosperity pricked the bubble of internal inflation and also reduced the level of non-agricultural employment. The countryside suffered considerably. In 1836 (12) it was reported that agricultural commodity prices had fallen on average by one-half since 1827 but that rents, the level of which were kept up by competition for land, fell only by one-quarter. By the later date cotton spinning and weaving, almost entirely for a depressed local market, were the only significant manufactures. Others were small and localised; salt and pottery making at the village of Birkirkara, cane work in Siggiewi and tanning in Tarxien. The fishing industry was so ill-developed as to make the Commissioners wonder whether fishing was even feasible.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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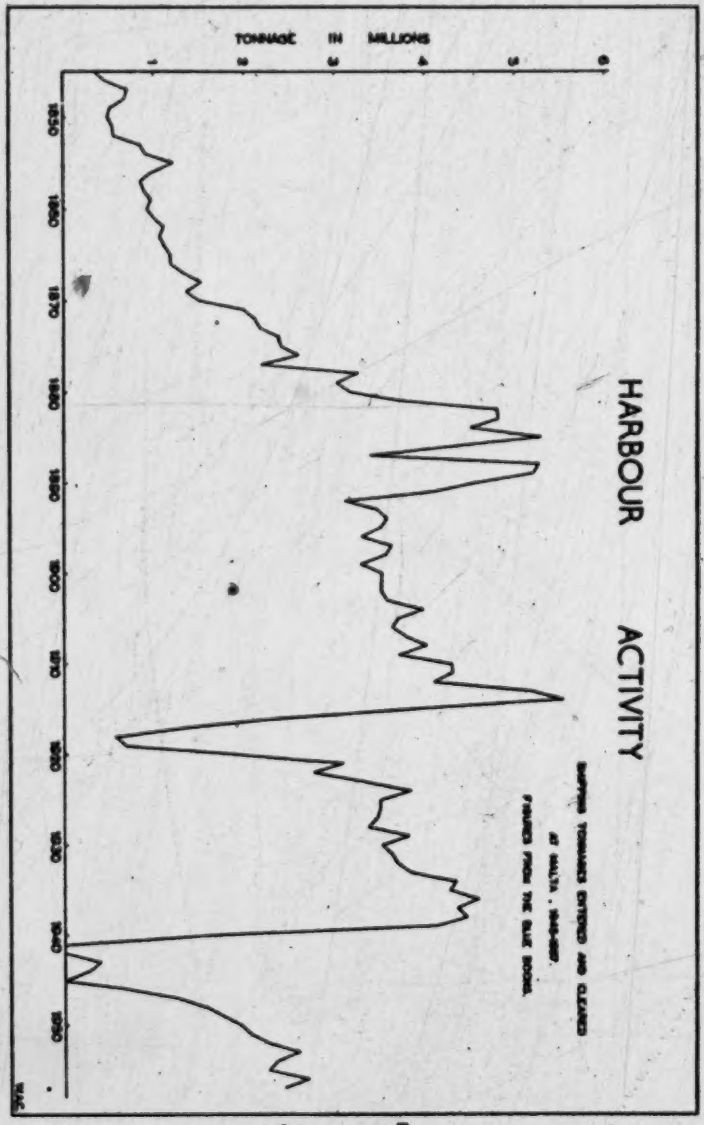

Fig. 30 Harbour Activity.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961

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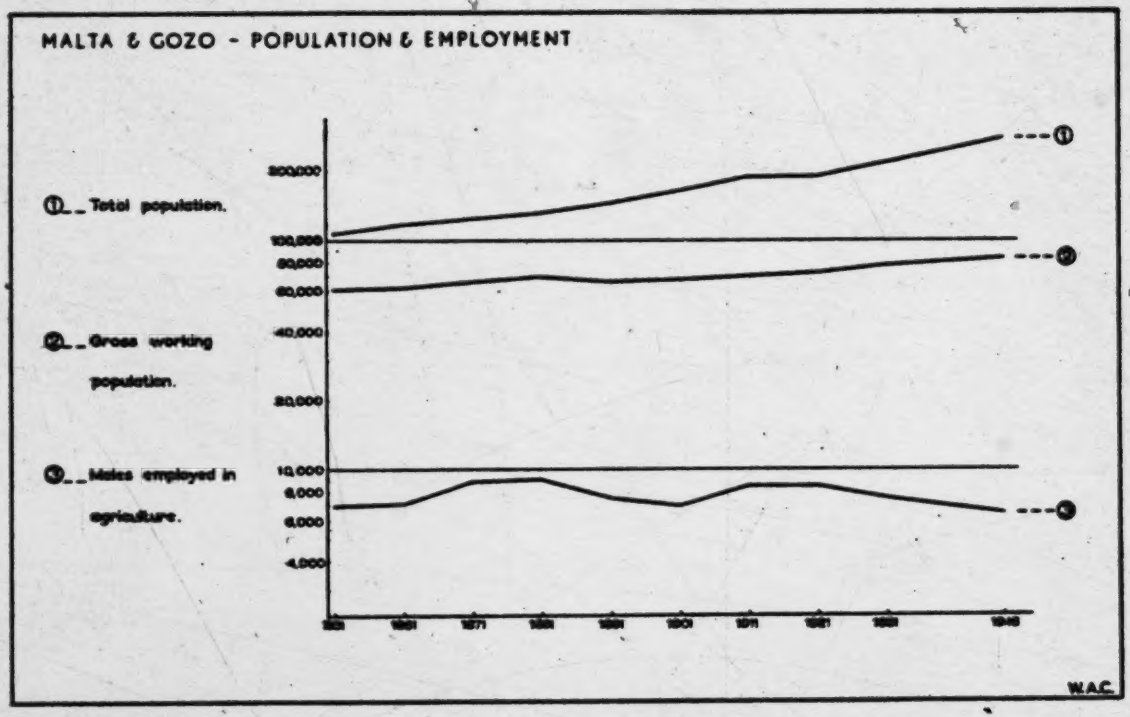

Fig. 31 Malta and Gozo, Population and Employment.

[p. 118-B]

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Part of the economic trouble resulted from the shortage of Maltese personnel capable or trained in the arts of public finance or in the exercise of private economic initiative, a natural result of the long period of paternal autocracy under the Knights. The position was improved neither by the lack of confidence felt by the British Administration in Maltese executive experience, nor by the attitude exemplified by Wellington's statement before the House of Lords (13): 'We hold it as an important post, as a great military and naval arsenal, and as nothing more'.

Nevertheless changes were in train. Paralleling the constitutional developments outlined in Section B of this chapter, and in symbiotic association with the demographic trends considered in Chapter VI A, the interplay of internal and external economic forces produced new economic patterns. In general, as the needs of British Imperial Policy, more variable than those of the strangely ossified Order, became greater, so Malta became more exposed to changes in world circumstances. Similarly, as commerce in its more rarified forms became dominant, world trade and business cycles were more and more closely reflected in the Maltese economy, evidence of growing integration into global conditions. An increased general sensitivity became characteristic of a more sophisticated but top-heavy structure. Under all lay the declining relative importance of that wealth based on indigenous resources and industries.

Between 1820 and 1854, the Maltese economy reflected slow world and regional adjustments to peace and to the growth of an international economy in which Britain led the way. Technological advances but slowly exerted economic effects. This was still the 'Iron Age' and of steampower in an embryonic form. Not until the 1850's, coinciding with a second phase of trade distortion and reawakening Imperial interest in the Mediterranean both associated with the Crimean War, came Bessemer's Convertor and the 'Steel Age'. The Maltese harbours still lay in a great inland lake, affairs on the shores of which alone were important. In 1827 (Battle of Navarino) the British fleet was based on Malta; in 1832 an Admiralty packet service was established and in 1839 the P. and O. and East India Companies used Malta as a calling port on their Egypt and Levant runs. The Crimean War itself demonstrated the regional limitation of Maltese shipping importance, and in the 1860's under one-half of shipping tonnage entered and cleared was extra-Mediterranean in character and most of that was British.

Even so, changes occurring before the middle of the nineteenth century were great enough to produce a sharpening of the old distinction between the 'Old Malta' of the villages, of the old nobility centred on Mdina, and the 'New Malta' of the harbours. The former was too parochially ignorant, the latter too centrifugally minded to allow of stable and regular development especially during a period of rapid external change.

In 1869 the Suez Canal was opened and the Mediterranean became a world highway. As the figures for shipping tonnages entered and cleared in Malta indicate (Fig. 30), and as also evidenced by the internal facts of migration and demography, land settlement and abandonment, employment and occupation, the Maltese economy entered a special phase after 1870.

Until this time, Malta's externally-based civil economy developed at average world rates rather than at the higher speeds found in Northern Europe. After 1870, shipping business and port activity in Malta increased more rapidly than did world trade and for two decades enjoyed a prosperity of which the Napoleonic and Crimean Wars had provided but a foretaste. Entrepôt trade with attendant commercial profits boomed and port employment benefited particularly from the increasing bunkering trade.

The Internal Revenue Account had remained based on the recommendations of specific and direct taxation made by the 1836 Royal Commission. Generally increasing commercial prosperity and the growing population, together with Imperial expenditure, so raised the level of consumption that import duties on food and drink made up over 40 per cent. of Government Revenue. Tonnage dues, and legal imports increased *pari passu* with port business. Only during two of the world slump years of the 1880's did rising expenditure produce current

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*175 43 revenue deficits. In 1878 a report by Rowsell on the fiscal situation in Malta is particularly indicative of buoyant conditions, but also indicated the smallness of revenue reserves (14).

The superficially favourable Internal Revenue situation and the fall in unemployment and migration, particularly after 1870, were however paralleled by a growing unbalance in the National Product. Once again there occurred a fortuitous coincidence of favourable external circumstances. The Suez Canal was opened in 1869 and fleets of small steamships plying the new route to the Indian Ocean needed frequent bunkering. The Mediterranean littoral itself became the scene of increased economic activity. The same industrial surge in northern Europe, and in Britain in particular, which built the ships and the Canal, needed foodstuffs and raw materials and provided the capital and equipment for their production. Not only from the Mediterranean littoral, Australia and the Orient, but also from the Russian and Danubian Black Sea ports came the ships which converged on the Malta Straits. Many regions suffered from the downward movement of commodity prices which occurred after 1873. Malta was little affected by commodity price-changes in that her commercial activity was strictly concerned with services, and the Islands reaped the benefit of increased volume of traffic. By 1882, 80 per cent. of the recorded tonnage using the harbours dealt with extra-Mediterranean traffic. The same year witnessed the nineteenth century peak of British steel exports, the Black Sea grain trade was still building up and bunkering business in Malta reached its height. During the 1880's Britain was in virtual control of maritime affairs and the complicated pattern of a relevant part of tramp movement may be summarised thus (15):-

> '... steamers go a round voyage, part of which is in ballast, taking coal, say, to the Mediterranean and then grain from the Black Sea to Hamburg and home... The course of the export trade in coal is influenced in some degree by the return freight... modified by favourable harvests or otherwise in different parts of the world, and the consequent varying sources of our food supplies'.

*175 43 505 In this statement may be found an explanation both of the reason for Malta's Golden Era between 1870 and 1890 and for its impermanence. Before 1890 events conspired to produce commercial opportunity. After 1890 Europe turned more and more to the New World for grain and the volume of Black Sea trade slowly declined. Those ships still in the trade, together with those using the through Mediterranean routes grew larger and more power-efficient and therefore less in need of frequent bunkering stops. Competition from other ports increased as the Mediterranean political pattern became simplified by effective French control of much of North Africa, by the enforcement of stability on Egypt and by Italian unification. The sheer momentum of nineteenth century economic progress carried centres such as Algiers, Naples, Alexandria and Barcelona, all with developing hinterlands and facilities, out of the class of ports pure and simple. By 1895 shipping activity in Malta had dropped back to the level of 1880 and thenceforward it developed at a slower rate than did world trade as a whole. The Maltese were once more sharply reminded that the possession of a good natural harbour was not enough in itself permanently to attract commercial interest.

Since detailed statistics of trade, other than that in dutiable goods, were not recorded before 1910 it is difficult to measure directly the real significance of port activity and trade either during the boom or in more normal conditions. The Blue Books are of some analytical aid, and that for 1891 suggests that the total value of what are termed re-exports was £35,000,000 of which only 3 per cent. by value were actually landed in Malta, the remainder proceeding to their ultimate destinations in the same bottoms. For further information we must turn to an analysis of the other elements in the National Product.

*175 43 464 161 The most useful records at our disposal are the Census recordings of occupations although even here there are considerable deficiencies. The gross working population (unemployment figures are not available before 1921) shows trends which conform to those of net population increase (Fig. 31) but particularly noteworthy is the numerical loss due to a decline in the female working

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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group. From 1851, when it composed 45 per cent. of the total, this element steadily decreased, absolutely and relatively. This general trend resulted from normal sociological changes consequent on a maturing of the whole economy and from the growing dominance of male employing service industries. At the same time, the preponderantly feminine cotton industry was steadily declining (see pp. 123 and 124).

One of the most significant indicators of economic change is that of male employment in agriculture (Fig. 31). During the first century of British rule, agriculture played no part in the economic expansion which was in train. Agricultural prosperity became a function of general prosperity and therefore to a large extent mirrored external fortune. Employment in the industry on the other hand, except for the shortlived cotton growing boom of the 1860's during the American Civil War, varied inversely with general economic activity. In Malta, as in most countries, it would be true to say that rising profits in farming benefited existing producers but failed to attract net incomers. On the other hand, population growth, the cessation of employment elsewhere, obstacles to emigration or even forces producing a return of migrants all periodically forced some workers back on to the land. Thus in the years between 1851 and 1871 while the population was growing more quickly than the slow but accelerating commercial activity, sheer population pressure and migration trends (16) forced the level of male agricultural employment from c. 7,000 to c. 9,000. During the Golden Years and the subsequent period of large-scale dockyard and public works construction numbers fell once more to c. 7,000 in 1901. Later stagnation in commerce and a decline in constructional work culminating in a severe depression (necessitating a Royal Commission) were marked by an increase in the number of farmworkers to 8,500 in 1911. These general fluctuations can be corroborated by reference to farm family histories and by changes in the availability of land. Behind the overall absence of numerical change and of those of secular variations we may discern some of the fundamental features of Maltese agriculture. By the middle of the nineteenth century, the better land had already been occupied by as many farmworkers as contemporary productivity could properly support. This number remained more or less constant, first because the economic and social climate was not propitious to the labour saving innovations which were sweeping over Europe, and secondly because the intake of land from waste did little more than compensate for losses elsewhere. We have a picture of a technically static, status declining and credit starved industry which from time to time lost some of its most vigorous and enterprising young workers or gained a flood of generally poor and semi-skilled labourers.

More true of Malta than of Gozo, this picture must be modified to accommodate regional differences and changes. Already in the eighteenth century, as we have noted, a cleavage existed in Malta between the *urbs* around Valletta, the Old City of Mdina-Rabat, and the rural communities. By the middle of the nineteenth century, this had developed into an embryonic form of the present division into urban, suburban and rural communities (Fig. 36). The social and demographic reasons for and implications of this are considered elsewhere (Chapter VI A) but the internal economic factors need present consideration.

Before the building of the railway in 1881, the tramways in 1905, and the later motorable roads, communication between villages and between country and town was relatively limited. Within those areas physically closest to what had now become the Grand Harbour the attraction/repulsion effects on agricultural employment were most strongly felt. On the eastern urban fringe, in the Żabbar area, these fluctuations were very violent and indicative of too complete reliance on two simple forms of economic activity, dockyard work and farming. On the western fringe the expanding economic and political functions of the nuclear *urbs* overwhelmed old villages such as Birkirkara and created new townships such as that of Hamrun in a more complex urbanisation (Figs. 32 and 39). Fluctuations in agricultural employment still occurred but these were less important than the steady decline in the total.

The changes outlined above proceeded slowly but at an accelerating rate during the second and third quarters of the nineteenth century. By 1871 popula-

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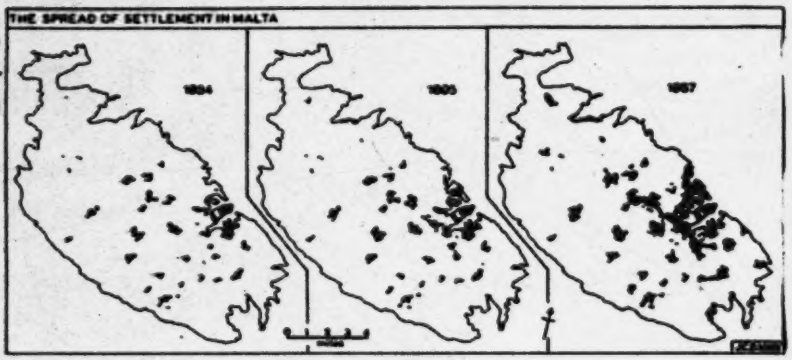

Fig. 32 The Spread of Settlement in Malta.

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Fig. 33 Malta: Sewerage.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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tion increase had overtaken economic growth, and in particular had forced an expansion of the cultivated area. As still evidenced in the landscape the farming frontier moved into the more difficult lands of the north-western uplands and on Mellieha Ridge and intensified effort on the floodable lands of Wied il-Ghasel. The *Società Economico-Agraria* in a series of reports and in the *Gazzetta Agraria Maltese* expended much effort during this time in studying the possibility of reclaiming land hitherto uncultivated (17).

From 1871 onward non-agricultural employment became absolutely dominant. The significance of this change lies in the fact that indigenously rooted manufacturing, viz. cotton working, died completely and the largest sector of National Production became entirely dependent on external wealth. A closer examination of one of the crucial periods, the decade 1871-81, illustrates the regional changes which were taking place. The male working population increased suddenly from 40,692 to 46,116. The greatest rate of increase occurred in the urban area where the number of male workers rose by 17 per cent, while the population increased only by 9 per cent. The suburban trend was intermediate between this and the rural situation where the employment rate rose by only 8 per cent. - less than 800 men. The greatest suburban rise occurred mainly in the following decade. Functionally the largest increase occurred in the group of Porters, Carriers and Coalheavers - 180 per cent., while the commercial group increased by 27 per cent. and the numbers in the building trade actually declined slightly. During this decade and most of the next the greater part of economic growth resulted from increased port activity. At one end of the social scale there would seem to have been an actual migration of nobility and gentry from the 'unfashionable' old centres into Valletta, while in the capital the number of 'gentry' increased rapidly with each census as successful *nouveaux riches* acquired estates and a higher status. Bankers, merchants and dealers increased by 8 per cent., and in ever descending and widening social circles, shopkeepers by 11 per cent. and petty vendors by 25 per cent. The Transport group, an advanced stage to that of Porters, increased in number even more astonishingly, by 139 per cent. in Malta as a whole and by 318 per cent. in the rural areas.

As Table 23 indicates, the economic revolution was becoming more complex and the sphere of influence of Valletta and the port became more extensive.

Table 23. Percentage change in the male working population.

Location	1861-71	1871-81	1881-91
Urban	+8	+17	-4
Suburban	+0.7	+12	+5
Rural	+9	+8	+1

By 1891 the port boom was over but Government expenditure and Imperial military spending continued to rise. Commerce came more to mean retail trade and dockyard work more associated with bunkering and naval servicing. Coal-heaving, civil and military, engaged 2,075 men by 1891. By 1905 over 9,000 men were employed by the Naval Establishments, half of these on constructional work. On the other hand, the build up of the garrison, naval and military ended in 1902 and the Royal Commissioners in 1911 estimated that 'the reduction of the garrison must mean a loss to the industries of Malta of not less than £400,000 a year'.

During the closing years of the nineteenth century there was finally established in Malta the complex economic pattern which still fundamentally underlies life in the Islands. The greater integration of economic life, a high level of urban and dockyard activity and the improvement of internal communications resulted not in continued movement into the *urbs* but in the growth of the suburbs and the strengthening of the non-agricultural element in the rural areas. Thus of the coalheavers of 1891, 50 per cent. lived outside the port complex and 44 per cent. in the outer ring of casals Qormi, Luqa and Żejtun. The labour

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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catchment area of the port was extended to include most of the east and centre of the island.

The decline in indigenously rooted economic activity is typified by the fortunes of the cotton industry, which after two millennia of regional fame finally succumbed to the stresses of the new world into which Malta had been introduced. Statistical information is limited to brief mention of employment in the industry in the Census Reports of 1851 and later. General material, often untrustworthy, may be gleaned from travellers reports. Field work (18) carried out during the last four years has given us the evidence of the few surviving cotton workers who can recall the character of the industry as it was in its moribund latter days.

In 1861 there still remained almost 9,000 workers occupationally described as spinners and weavers and some 200 beaters and dyers. Ninety-six per cent. of the total were women, and male labour was generally used only in the final stages of cloth preparation. The industry included all processes from the growing of indigenous short staple annual cottons to the manufacture of cloth. The actual operations however were carried out almost entirely by individual workers in their own homes and were linked only by merchants specialising in this trade. In many cases merchants advanced seed to the farmers on a crop-sharing basis. In all cases they bought the picked lint and then distributed quantities by weight to 'out-work' spinners. These would return the yarn, which had been prepared by primitive traditional teasers and spinning wheels, and were paid by weight and fineness of the yarn. The village merchant would store the yarn until he received an order for cloth and would then make similar contracts with domestic weavers.

That this type of 'out-work', domestic industry survived late into the nineteenth century is a commentary on the social and economic needs of the poorer village and rural classes. Much of the female labour described as occupied in cotton-working was often only seasonally thus employed. The 1861 census taken in the autumn in contrast to the usual spring period clearly illustrates the seasonal change of work between spring harvesting and tillage in the fields, and the home use of the spinning wheel after the autumnal harvest. Tariffs and quotas on trade in lint and yarn were deliberately employed to protect in the domestic market this last employment reserve of the 'lower classes'.

Finally however tradition and protection proved powerless to prevent change. In the harbour area the decline was rapid after 1851, alternative employment and the impact of trade virtually killing the indigenous cotton industry by 1901. Away from the conurbation the same factors operated more slowly but still inexorably. Żebbuġ and Rabat, centres of old Malta, were the last to succumb. The former, a great centre of mercantile and ecclesiastical wealth derived from cotton, remained relatively important for weaving until 1914. In Rabat, the suburb of the old capital, a craft industry still survives. With the coming of new opportunities for wealth gaining, not in trade but in mass employment in the dockyards and towns, the last *raison d'être* of the cotton industry disappeared. It survived longest in the cotton growing regions of the west and in the most Maltese of the old villages of the Centre and South. With its disappearance died the last considerable skilled employment of traditional resource wealth.

Changes such as these characterised the Maltese economy during the nineteenth century. World War I marked the end of an epoch during which the evaluation placed on Malta by Britain was sometimes questioned but never invalidated. The Maltese economy as it existed in the opening years of the twentieth century had reached the logical culmination of a specialised development which had been under way for centuries.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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B. Constitutional and Social

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As well as those aspects of economic and commercial life examined in Chapter V A, other elements of recent historical experience in Malta need to be considered before we can begin to understand the contemporary scene. Of these other elements, only a few can be mentioned here, some 'institutional' in character such as problems of Government, Public Health, Education, and the Church; others more individual - consisting of the factors other than institutional that govern human choice - are considered in Chapters VI and X F.

First a brief survey of constitutional developments in Malta. One main theme runs through the whole history of government in Malta, a theme which illustrates the close parallelism of social and economic developments. In so far as Malta exists mainly in terms of her locational value to non-Maltese powers, any system of government is forced to subordinate local interests to those of the metropolitan power. This can always be justified by the valid assertion that the survival of even a residual part of the former depends on the strength of the latter.

Before 1798, government was naturally conceived of in strictly feudal terms. The Order of St. John exercised immediate sovereignty, the indigenous territorial nobility maintaining a certain precarious status by courtesy of the Order. Two assemblages existed, also mainly by courtesy of the Knights, the *Consiglio Popolare* a self-nominating body of squires and clergy which appears to have had very limited nominal functions, and the *Consiglio dell Universitá* the body controlling the central grain monopoly and which to some extent overlapped with the *Consiglio Popolare*. The municipalities, an over-elaborate name for the towns and villages, were headed by *giurati*, essentially village headmen, and selected nobles. All power, as distinct from position, resided in the hands of the Grand Master and his Council, this necessitated by the function of the Order.

Between 1798 and 1802 British intervention was based purely on military needs as then conceived. During and after French occupation the vacuum left by the *de facto* departure of the Order was to some extent filled by the spontaneous formation of a rather amorphous *Congresso* of local leaders. This body in 1802 declared its refusal to submit either to the return of the Order or to rule by the Kingdom of the Sicilies, but was prepared to become subject to the British Crown. Such a declaration together with claims for acknowledgment of special rights for the *Congresso* and the *Consiglio Popolare* and of the Church, could not be simply accepted in wartime conditions, but provided the basis for later development.

Until the Royal Commission of 1812 (1) made its recommendations for Direct Rule, recommendations followed by the appointment of the first Governor Sir Thomas Maitland in 1813, there was considerable confusion concerning the constitutional position. Briefly we may say that then as later the issue was complicated by three main issues. In the first place, the claims advanced by the Maltese nobility were not consistent with their lack of experience of governing. Secondly, as the 1812 Commissioners found, the old assemblies were neither representative or experienced. Thirdly, the needs of the British Crown were functionally similar to those of the Order in that paramount consideration had to be given to operational security for military and naval forces. Given a largely illiterate and inarticulate indigenous population and an extremely undeveloped feudal society in Malta the final decision was contemporarily valid.

In 1835 Gubernatorial rule was modified by the creation of an advisory 'Council of Government'. By this time certain changes had begun to take place in Malta. As noted in section A port activity and trade had flourished during the closing years of the Napoleonic War, and the new entrepreneurs sought both compensation for the later depression and acknowledgment of the existence of a small but growing *bourgeoisie* in political agitation. The Maltese nobility had continued to press their claims for recognition and power, and negotiations concerning the status of the Church *vis-a-vis* the Metropolitan Court at Palermo, the Papacy, and the Maltese Juridical System, had been held. The 1835 Constitution

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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was regarded through Maltese eyes as unsatisfactory but no real body of Maltese as opposed to sectional opinion had yet developed.

Letters-patent were issued in 1849 for the reconstitution of the Council, on more liberal lines. Of the ten ex-officio members of the administration, half were Maltese, and eight other members were to be elected on a qualified franchise limited by age, financial and literacy qualifications. This development reflected growing liberalism in England and a decline in the emphasis placed on the fortress function of the Islands. In Malta the uneasy relationship between Church and State absorbed more direct attention than did the political situation, but in the issues involved one may perceive the crystallisation of later conflicting elements. Education, an integral part of the activities of the Roman Catholic Church, could not easily be interfered with by a constitutionally Anglican Imperial Government. The natural links between the Maltese Church and Italy reinforced old literary and political connections, and, in the absence of anything other than a vernacular and rural manifestation of indigenous culture, a division between pro-English and pro-Italian groups started to appear. Judicial problems which derived from the great differences between the English legal system and the complex and unique Maltese codes, were further exacerbated by the stand taken by the Church. Press censorship, discriminatory libel laws, and privileges for the clergy were all modified only in the face of ecclesiastical opposition (2). Within six years of the promulgation of the new constitution, the reserve of Royal Power had to be used in Council to make it effective. Harrison-Smith (3) maintains that out of it all 'whether dominant or not, the Church emerged *protected* by the Government'.

During and after the Crimean War the issues involved became clearer. The revival of British strategic interest in Malta eventually resulted in, among other things, a reversion to the practice of appointing as Governor the Commander of the Imperial Forces. During Le Marchant's tenure of office (1858 to 1864) in particular, the differences of interest between the appointed and elected members of Council began to produce a permanent division of that body. The exclusion of clergy, religious and judicial officials from the Council between 1857 and 1870 is rather difficult to assess in its consequences. The Council might have become less secularily factional if ecclesiastical opinion which was then not much concerned with purely political matters had been directly represented. Such a course might on the other hand have drawn the Church into the political maelstrom; Malta has been fortunate in that the Church in the event has been able to represent itself as above politics. The main contemporary consequence was that the elected portion of the Council became almost entirely composed of professional men, mainly from Valletta and largely of Italian-Maltese sympathies. The events taking place on the Italian mainland, the immigration into Malta of a number of Italian families, affected in particular the sympathies and feelings of the two and a half thousand electors, who, by the nature of franchise limitations, were already in language and culture quite distinct from the great mass of people.

In 1864 the strength of local articulate feeling was acknowledged by Imperial instructions that 'great consideration should be shown to the opinions of Elected Members... above all, no vote of money should be pressed against the majority of the elected members except under very special circumstances...' (4). The problem however remained. Public Works expenditure was soon to rise, touched off by the Cholera Epidemic of 1865, the appointment of a Commission of Public Health in 1874, and the appearance of the Keenan Report on Education in 1880. Such expenditure very often had to be 'pressed against the majority' opinion because of suspicions felt regarding the effects of development policies. It would be quite wrong to present a picture of a consistently benevolent and far-sighted administration forcing progressive measures upon conservative and bigoted elected members; nevertheless it is nearer the truth than a reversed presentation would be. Until 1887, political and constitutional dispute too often resolved itself into trials of strength, with little regard to the merits of the issues concerned, between the Governor and the Council majority. More serious causes of trouble were the Council's claim of Parliamentary privilege for its members,

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*175 64 and in 1877, the first use by the Elected Members of the tactic of absenting themselves on occasion of disagreement with the Governor-as-President.

During the 1870's and 80's commercial boom, the associated rise of the *bourgeoisie*, together with the example of party politics in England, and the *175 *Risorgimento* in Italy, all produced a headiness in Maltese political thinking and a clear division of interests. In 1883 the Governor reported that government 64 was now being obstructed by the appearance in the Council of two groups, apart 665 from that of the appointed members. The first, the *riformista* group was essentially a pro-English language faction, the second the *anti-riformista* was pro-Italian, that is favouring the old dominance of Italian language and culture. From this time onward political parties were born, to English eyes in strange and not easily recognisable forms. In Malta as in other countries in which such parties were sudden products of factional conflict rather than as in England slow crystallisations of attitudes, the names, the labels, such as 'Nationalist', 'Constitutionalist', 'Labour', 'Progressive', 'Workers' are misleading rather than illuminating. To English legislators, then and since, the difficulty of recognising lines of cleavage other than those with which they are by experience familiar can be very dangerous.

*175 As noted later (p.130) the greatest part of the population was little affected 64 through education by the many developments that were taking place. This group, the Maltese-speaking rustics and labourers, was usually illiterate. In the new liberal constitution promulgated in 1887 this element of the population further restricted by age, financial and legal qualifications was to be represented on the Council of Government by ten members themselves selected by rigorous financial and literacy qualifications. The remaining four elected members, even more rigorously selected by financial criteria, were to be chosen by special electors, viz. ecclesiastics, nobles, large landowners, senior members of the University, and members of the *Bourse*. This system of representation, logically defensible at all points, was to have two tragic results of particular relevance to our present study. The first was to ensure that a great deal of power without either the privilege or steadying influence of responsibility was given to the most cosmopolitan and the least Maltese of the Islands' people. Secondly that the cleavage of interests within this largely professional class, although stemming from differing legitimate interpretations of their own ideas of Maltese welfare, soon led to rarefied and rather sterile contentiousness in which little reference was made to the facts of real life in Malta. The old dichotomy between the Maltese and the Knights became perpetuated in a division between the upper middle-class Europeanised Maltese, and the remainder. It would be permissible to suggest that the bridging of this gulf often appeared more important to Englishmen than to the Maltese themselves, although there are of course notable exceptions.

The allocation of power provided for the supremacy of the executive over what had now become a legislature, even although the appointed members were as a group in minority, but it made the wielding of such supremacy a more delicate matter than had been previously the case. No dyarchical division between imperial and local interests was made. For our purposes, however, these and other details of the 44 constitutional articles, are of less significance than the fact that Dr. Fortunato Mizzi and Count Strickland, who in 1886 together led the agitation which led to the new Constitution, were in open disagreement two years later.

*175 Externally this was a period in which England, France, and to some extent 64 Germany were entering on a contest for naval supremacy, and in which the short 665 burst of conscious European desires for imperial aggrandisement produced many tensions. Increased naval and dockyard activity in Malta was paralleled by a rising tide of secular education, anglicisation and pro-Italian, pro-bourgeoisie reaction. The Maltese and Catholic Strickland, President of the Committee of Privileges of the Maltese Nobility, became Chief Secretary to the Government in 1889, and in his support of Maltese development on English rather than Italian lines, carried on the policy of the equally Maltese and Catholic Savona, one-time Director of Education.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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By the end of the century the struggle had resolved itself into extremes. Mizzi and his followers resorted to continuous legislative obstruction as the only but rather unworthy weapon left for what they maintained was a fight for responsible government. Strickland as Chief Secretary pointed correctly to the damaging effects such tactics were having on all policies including those of education, public health, etc., but conducted an offensive/defensive battle on equally intransigeant lines. Meanwhile British, Imperial as opposed to economic, effort was at its climacteric and Malta as a fortress, whose only value was as a fortress, had to 'suffer' the consequences; a necessary qualification must be made that this really entailed only subordination in status and was accompanied by great advances in all that the mid-twentieth century would term 'welfare services'.

In 1903 Anglo-Italian relations were good and improving, the Crown and the Vatican, Governor and Archbishop all in amity, while in Malta, 180,000 people had 10,000 enfranchised electors of whom less than 4,000 ever voted. In the Legislative Council, however, tempers were at blazing point and obstruction produced deadlock. Followed Chamberlain's bombshell abrogating the constitution. With effect from 3rd June the Governor's Executive Council and the official group within the Council of Government were given majority power and complete control over policy and action. The reserve powers were re-invoked in all their strength. Malta entered the Modern Age in an unhappy political state, a state vocally resented by a few, ignored by the apathetic majority and a cause of unhappy puzzlement to Westminster.

In retrospect, to the writer at least, the most amazing feature of these developments appears to be their inevitability. Judged in isolation, it may appear facile to suggest that with the stage as set in preceding centuries, with players such natural 'typecast' products of past experience, no other play could have been produced. Judged along with the other evidence, the unity, the cohesion of all things Maltese do make it rather difficult to subscribe here to a doctrine of free-will.

Of the elements in Maltese social life most affected by institutional forces two are of very relevant interest to us, viz. public health and education. Some brief consideration is therefore given to the main developments of these sectors.

As noted in Chapter VI A the death rate in the Maltese Islands fluctuated considerably but showed a slowly accelerating decline. During the century that elapsed between the end of the Napoleonic Wars and the beginning of World War I, the main health improvements resulted from public works construction of a piped water-supply and sewerage systems in the most populated parts of the island of Malta. Developments in preventive remedial medicine and in disease control were slower mainly because of their greater dependence on trained medical staff and on public acceptance of new ideas.

At the mid-nineteenth century conditions were not very propitious for the consideration of suggestions for reducing mortality. Forecasts of impending Malthusian catastrophe were combined with diatribes on the improvidence of early marriage in many surveys by articulate Maltese of a presumed state of overpopulation. The inarticulate members of society continued to regard as normal conditions of which Sutherland (5) said: 'I have very seldom met with conditions so obviously injurious to health, and so likely to determine outbreaks of epidemic disease as those presented by many houses'. In Valletta the Knights had built a sewerage system and a piped water supply but pollution of the latter by the former was common. In the villages, the deficiency of water, refuse accumulation and the use of 'ordure rooms' were a product of ignorance and a cause of ill-health.

The Cholera epidemic of 1865 which slew 2,000 people eventually forced action upon the Government and after much general discussion a Commission of Public Health was appointed in 1874. Significantly enough, attention was focussed on the high rate of child mortality: in that same year, of over 4,000 recorded deaths, more than 2,000 were of children under five years of age. Between 1874 and the end of the century a series of reports put the blame on a series of associated factors. The ancient Three Cities and the new unrestricted

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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urban growths of Hamrun and Sliema were centres of disease. The growth of urban and dockyard employment had not yet been accompanied by any striking educational improvements, and standards of personal hygiene barely tolerable in rural Malta became insupportable in the new towns. At the same time, the growing wealth and opportunities which made possible the new concentrations were not paralleled by similar rates of increase in Internal Revenue. The resulting shortage of capital available for public works delayed the construction of services until concern over conditions in the Garrison centres became acute. Between 1878 and 1886, a new system of drainage and flushing sewerage was constructed in Valletta, Floriana and the Three Cities, three-sevenths of the expenditure being provided by the military authorities. The 1897 sewerage extensions were similarly restricted to that area in which a financial vote could be subsidised by Imperial expenditure (Fig. 33). During this period also, the whole problem of water-supply first became acutely realised and under Chadwick (8) a water-use policy made an embryonic appearance. The 1909 proposals for island-wide sewerage were, significantly enough, for a sea-water flushing scheme, and in spite of depression-caused limitations public funds were made available for servicing the suburban areas of Hamrun and Birkirkara and the casal of Żejtun.

These and similar public works, limited in scale as they may now seem, were already having a controlling effect on epidemic disease by the end of World War I. In 1837 cholera killed 4,000 out of a population of c. 116,000; in 1917 fewer than a hundred people died out of a population which had doubled in size. Bubonic plague caused 4,600 deaths in 1813 but in 1917 only 3 mortalities followed a similar introduction of the disease. By the nature of her position and as a result of sea-borne contacts Malta has always been liable to the introduction of epidemic diseases. The nineteenth century intensification of urban and port activity which caused population concentration in a great conurbation, increased the external contact risk, made more acute the dangers of ignorance and low standards of hygiene but finally the associated expenditure of wealth derived from overseas, and improvements in domestic standards started a breakthrough into an epoch of adjusted and improved values placed on human life.

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In the educational field, progress was necessarily slower in that while public health measures were essentially a matter of providing physical services which previously did not exist, formal education had to be accepted *ab novo* by the great unlettered mass of the population, and secular public instruction had to meet the suspicions of the educated few associated with the Church-dominated, Italian-influenced University and academies (7).

British rule was followed by Government controlled education. The first elementary school was opened in 1819 and in 20 years' time there were 11. In 1842 the elementary school system was removed from the authority of the University, as recommended by the Royal Commissioners in 1838 (8), and its effectiveness was considerably increased. Even so, illiteracy was still high at mid-century (9) and the labouring classes still relied for information and guidance on the traditional sources - the Church and to a less extent the gentry.

The 1836 Commissioners noted a situation which is still not completely rectified (10). They blamed the educated classes for lack of initiative in permitting the continuance of an educational system which was geared to the training of priests, lawyers, doctors and civil servants and which virtually ignored wider social and technical needs. This same complaint was reiterated by Keenan in 1880 (11) and by Casolani, Director of Emigration in the 1930's (Chapter VI A). Through inertia rather than by deliberate act, the old social cleavage between the 'Two Nations', was being maintained.

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A prime difficulty was that of language. The Census compilers of 1881 commented thus on the root of the trouble (12): 'The Maltese... form part of the European family, however they speak the dialect of a language belonging to an oriental people with whom they have no social tie nor connection... As the dialect is confined to the Islands of Malta consequently very few literary productions are published in the vernacular, a circumstance which evidently does not favour the diffusion of instruction among the lower classes of the people.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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'The language... is Oriental and the Education is given in English and in Italian.

'... the Boys and Girls attending the Elementary Schools belong generally to the poor Classes. Before these children can acquire a competent knowledge in any of the Languages taught to them, they are generally taken away by their parents in order to be apprenticed to some trade or employed in agricultural labour. Consequently the child... forgets the Italian and English, foreign to him, owing to want of time and practice in reading and writing, and to his being also obliged to constantly speak and hear nothing but Maltese, the native dialect of kith and kin...'.

Given this situation, a conflict was bound to rise between the claims of Italian and English, with, as we have seen, all that that implied in religious, constitutional and economic affairs. The measures advocated by Keenan and the policy of Savona, Director of Education at the crucial period, resulted in the consolidation of English as the language of instruction. Consequentially English, and more slowly Maltese, gained in importance as Italian declined. While Italian language and culture became the symbols of opposition to the Government, such opposition became less and less associated with general popular feeling. In 1842 less than 4,000 children attended all schools (13); by 1908 almost 18,000 attended the Government primary schools alone (14). In 1902 parents of school-children were asked which language they wished to have used for instruction; the results were striking (15):

Standards up to III - Questioned on basis of either Italian or English

	Malta	Gozo	Both
English	98.7%	87.5%	97.7%
Italian	1.3%	12.5%	2.3%

Standards V and VI - Questioned on basis of single or combined use of languages.

English only	71.2%
English and Italian	27.8%
Italian only	1.0%

By the end of the period under discussion, the policy of anglicisation was triumphant, misgivings regarding the position of the Church had been allayed, and the Maltese economy was firmly associated with the wealth and needs of the Garrison. The Constitutional impasse had no immediate relevance to the life of the people. That social life was still dichotomous, although on a less insular plane than it had previously been.

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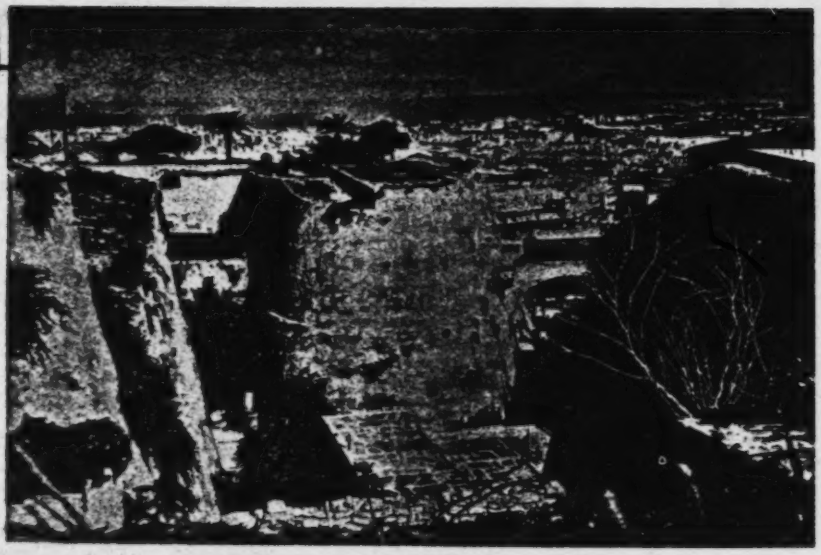

Plate XI. The Bastions, Valletta.

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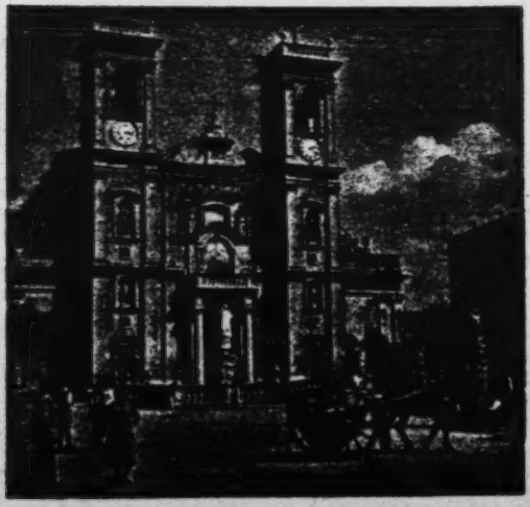

Plate XII. The Church and Piazza, Żebbar.

I: Bowen-Jones et al. K-5 (1955-1958) 1961
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Chapter VI

MODERN MALTA

A. Population and Migration

It is common knowledge that the Maltese Islands now possess a population which is extremely large relative to the territorial area. Polemical discussion of the implications of the situation has generally been based on two assumptions. The first is that the present size of the population is wholly a consequence of a simple vital revolution which occurred during British rule in the nineteenth century. The second assumption is that this vital revolution is almost over and that falling birthrates will stabilise the population at a new and higher level. These assumptions are erroneous. The brief study that follows (based on a full-scale investigation of many types of source material by M. Richardson and others), attempts to show the true characteristics of Maltese demography.

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THE POPULATION BEFORE 1842

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Table 24. Estimates of population A.D. 991 to 1842.

	I. MALTESE		II. NON-MALTESE		III. TOTAL
	Malta	Gozo	The Knights	Other	
(1) 991					21,000
(2) 1240	3,600	1,800			5,600
(3) 1400					10,000
(4) 1528	12,000	5,000			17,000
(5) 1530	15,000	5,000	5,000		25,000
(6) 1565	19,500	2,500	9,000		31,000
	17,500	2,500	3,000		23,000
(7) 1582	20,000				
(8) 1590	28,864		3,426		32,290
(9) 1632	45,450	3,000	4,450		52,900
(10) 1741					110,000
(11) 1760	66,800				
(12) 1798	90,000	24,000			114,000
(13) 1807	80,225	12,829		22,100	115,154
(14) 1813	96,403	14,400			110,803
(15) 1823					112,204
(16) 1836	98,618	15,618		1,709	115,945
(17) 1837	98,958	16,822		4,398	119,878
(18) 1842	97,535	14,330		1,999	113,864

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Fig. 34 Maltese Islands: Growth of Population 1530-1842.

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1:Bowen-Jones et al. K-5 (1955-1958) 1961
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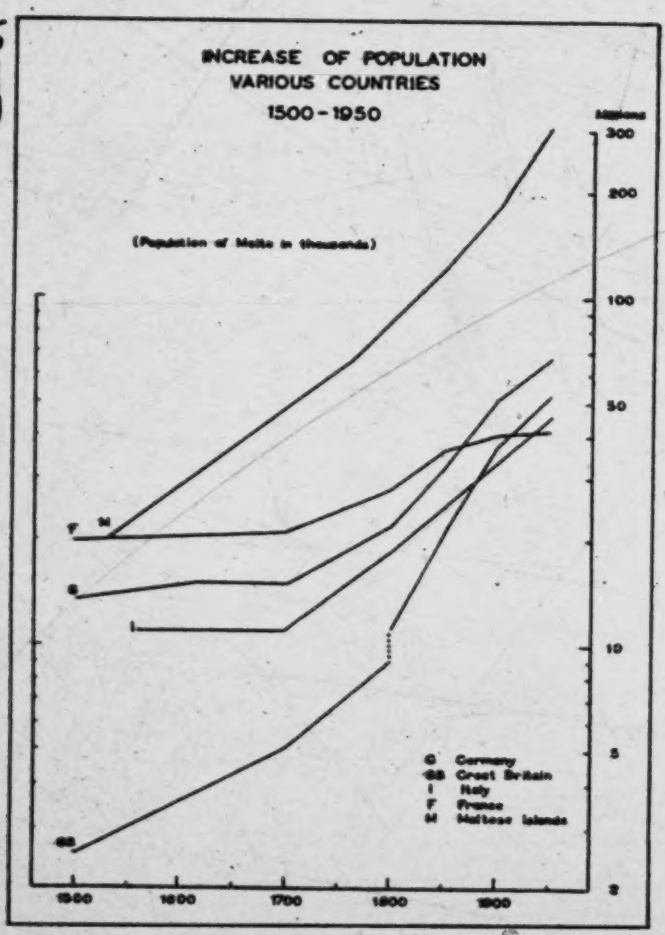

Fig. 35 Increase of Population, Various Countries, 1500-1950.

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1:Bowen-Jones et al. K-5 (1955-1958) 1961
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MALTA – GROUPING of LOCALITIES into CENSUS DISTRICTS

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LOCALITY	1842	1851	1861	1871	1881	1891	1901	1911	1921	1931	1948
VALLETTA	Valletta										
FLORIANA	Floriana District				District				Urban		
KOSPIKWA	Cottonera						East				
SENGLEA											
VITTORIOSA				District			District				
HAMRUN	Valletta										
STA.VENNERA											
MARSA											
SLIEMA	Third										
GŻIRA											
ST. JULIAN'S	District				District						
MSIDA									Suburban		
PIETA											
BIRKIRKARA							Central				
QORMI							District				
PAWLA	Fifth District						East				
TARXIEN											
ŻABBAR	Seventh District						District				
KALKARA											
MDINA	First District						West				
RABAT											
DINGLI							District				
MĠARR											
SIĠĠIEWI	Second District						Central				
ŻEBBUĠ						Districts					
MOSTA	Fourth District						West				
MELLIEHA							District				
ST.PAUL'S BAY											
NAXXAR											
GHARGHUR							Central				
LIJA											
ATTARD	Third District						District		Rural		
BALZAN											
LUQA	Fifth District										
ŻEJTUN						Country					
MARSAXLOKK											
BIRŻEBBUĠA	Seventh District						East				
GUDJA											
GHAXAQ							District				
ŻURRIEQ											
SAFI											
KIRKOP	Sixth District										
QRENDI											
MQABBA											

M.R.J.C.D. 1958

Fig. 36 Malta: Grouping of Localities into Census Districts.

[p. 134-C]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

The earliest recorded estimate of the population of the Maltese Islands is one of 21,000, made by the Emir Yusuf al Futah in A.D. 991 (1), but this would appear to be excessive in the light of Abate Giliberto's report (2) of approximately 1,000 families in 1240 and Bosio's suggestion (3) that total numbers in A.D. 1400 did not exceed 10,000. The Commissioners to the Knights (4) estimated a total population of about 17,000 in 1528 to whom were added, shortly afterwards, members of the Order and their followers, some 5,000 in all. That the population of the Islands in 1530 was in the region of 20,000 may be assumed from data given by a number of writers including Fra Joannus Quintinus, Bosio and Boisgelin (5).

The first half of the sixteenth century appears to have been a period of steady population increase in Malta, but Gozo suffered a severe setback in the Turkish raid of 1551 when large numbers were taken away as slaves. At the time of the Great Siege of 1565, members of the Order numbered 9,000 and the civilian population was in the region of 22,000 (6), a total of 31,000 of whom perhaps 5,000 lived in Gozo. Fatal casualties sustained by the Maltese during the Siege numbered 8,000 according to Zabarella, and Bosio puts the civilian population after the Siege at 20,000. A similar total was reported for the civilian population of Malta alone, excluding the Knights and their followers, by Grand Inquisitor Visconti in 1582 (7). In 1590 an enumeration was made for the Viceroy of Sicily (8). A detailed enumeration was made for Grand Master de Pawla in 1632 and is recorded by Abela (9). The members of the Order numbered 4,450 while the 'native' populations of Malta and Gozo were said to be 45,450 and 3,000 respectively, a grand total of 52,900.

Information is fragmentary for the period 1632-1807, although an estimate of 110,000 was made in 1741 (10) conflicting with Ciantar's figure (11) of 66,800 for Malta only, excluding members of the Order, in the year 1760. The former total is obviously much exaggerated. Boisgelin's total (12) of 114,000 in 1798 is equally unreliable as is shown by its estimate of 24,000 for Gozo, when that Island is known to have had only 14,000 inhabitants in 1842 (18) and there is no evidence of large-scale migration from Gozo in the intervening period.

The first detailed enumeration after the withdrawal of the French was recorded in an almanac of 1807 (13) and was based on Parish registers. This shows a 'native Catholic' population of 93,000 and a total of 22,100 'other inhabitants and domesticated strangers'. The 'census' of 1828 (16) gives a total which differs by a few hundreds only from that of 1807, and although the outbreak of plague in 1813 would in part account for the lack of population growth during the period, there can be little doubt that the 1828 enumeration had considerable deficiencies. That of 1837 (17) had similar defects. Over-estimation seems to have been a common feature of counts made in the early nineteenth century, since the first official census (18) of 1842, recorded a total population of only 113,864.

There is not sufficient material for any valid conclusions to be reached concerning the rate of population growth in the Maltese Islands before 1530, but the various estimates made between 1530 and 1842 permit an assessment of trends over the three centuries preceding the first official census. In Fig. 34 these estimates have been plotted on a semi-logarithmic scale and the trend of early nineteenth century population growth back-projected to 1530. Assuming a steady rate of increase, all the sixteenth century estimates, together with those of the nineteenth century are close to the totals arrived at by interpolation, but, in the intervening period, the figures given by Abela and Boisgelin appear grossly inaccurate. Abela's estimate for 1632 seems likely to have been at least 15,000 too great, his postulated increase of 100 per cent. or more over the figure for 1582 being an obvious impossibility. Boisgelin's total of 114,000 in 1798, includes a definite over-estimate of at least 10,000 in the case of Gozo and a probable exaggeration of 10,000 for Malta. Interpolation suggests a figure of 90,000 for the native population of the Islands in that year.

It is noteworthy that, between 1530 and 1798, the period during which the Knights of St. John were in control of the Maltese Islands, the population of Malta and Gozo together increased by some 280 per cent. from 25,000 to 90,000 while

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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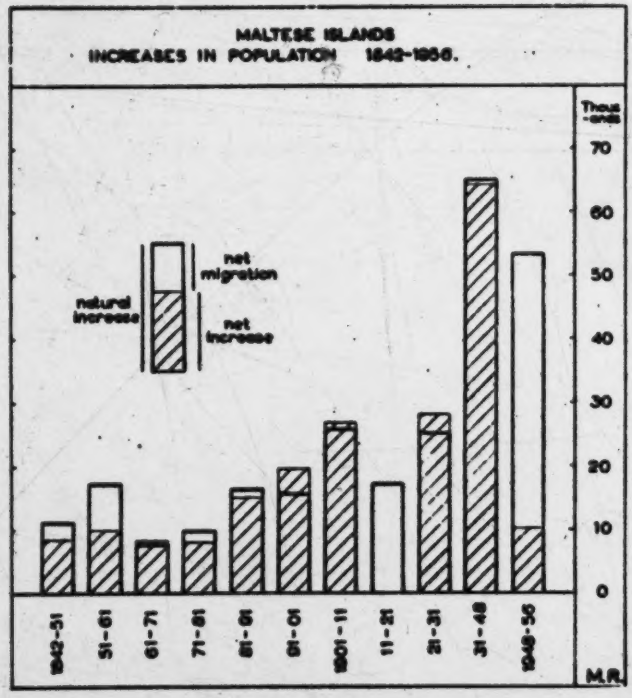

Fig. 37 Maltese Islands: Increases in Population, 1842-1956.

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much of the rest of Europe had static or declining numbers until the eighteenth century (Fig. 35). The relative security and stability of Maltese life during this period is thus reflected in the population figures. Excessive pressure of numbers on resources was becoming apparent before the British era and emigration was suggested as early as the eighteenth century (19). That this particular problem has become intensified during the period of British sovereignty is a result of further acceleration in the rate of population increase which, as we shall see, has been a product of improvements in social and economic welfare.

Table 35. Increase of population 1830-1956

Average annual increase %

Period	Maltese Islands	Malta	Gozo
1830-1842	0.63	0.74	0.33
1842-1956	0.90	0.96	0.58

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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THE POPULATION AFTER 1842

Manuscripts of the unofficial census of 1828 are no longer extant and details of this enumeration are available only at second hand in Miège's *'Histoire de Malte'* published in 1840. The first regular Census of the Maltese Islands was taken in 1842 and the second in 1851, to be followed by decennial censuses until 1931. The war prevented any enumeration in 1941, and the eleventh Census took place in 1948.

Widespread illiteracy and the absence of penalties for non-compliance were obvious hindrances to accurate census-taking in nineteenth-century Malta. Thus the coverage of earlier censuses is unlikely to have been complete. The information asked for (20) has also been an extremely variable quantity (Table 26).

Table 26. Subjects covered in the censuses from 1861 to 1948.

Subject	Number of tables on each subject								
	1861	1871	1881	1891	1901	1911	1921	1931	1948
Total Population			1	3	3	3	3	5	
Non-civilian Element			1	6	4	8	4		
Civilian Population									
Distribution and Increase	2	2	3	3	3	3	3	3	4
Ages	3	2	2	9	9	11	9	10	4
Marital Status	2	2	3	8	8	6	6	7	7
Occupations	2	2	3	5	5	4	4	4	33
Birthplace and Residence	2	2	7	10	10	9	9	10	11
Religion			2	2	2	1	1	1	
Housing of Families. Dwellings	2		2	5	4	4	4	5	16
Health and Vital Statistics	8	2	3	4	4	5	5	2	3
Asylums and Penal Institutions	1		6	4	4	4	4	3	
Maltese Abroad			1	1	1	1	1	1	
Miscellaneous	6[a]			10[b]	14[b]				16[c]
TOTAL Number of Tables[d]	19	4	30	80	83	67	61	62	96

a. Including four tables on the Judicial Courts.
b. All on Agriculture.
c. Including ten summary tables of all aspects.
d. This may not be the same as the total of the tables on each subject, since some tables cover more than one subject but have only been included under one heading.

The number of subjects dealt with has progressively increased, but few of the tabulations are strictly comparable for all censuses. In the nine censuses taken between 1861 and 1948, it is remarkable that not one tabulation has been preserved unchanged over the whole period. Apart from these variations in the scope of the census, there have been frequent changes in the number and grouping of the territorial units under which the figures are given (Fig. 36).

When considering population trends in the Maltese Islands, a good deal of confusion is also occasioned by the presence of a considerable non-Maltese element which produces fluctuations and changes in the pattern of population growth which are not characteristic of the Maltese people. This must always be borne in mind when considering the Census Reports which do not always make clear the distinction between the two groups.

[563]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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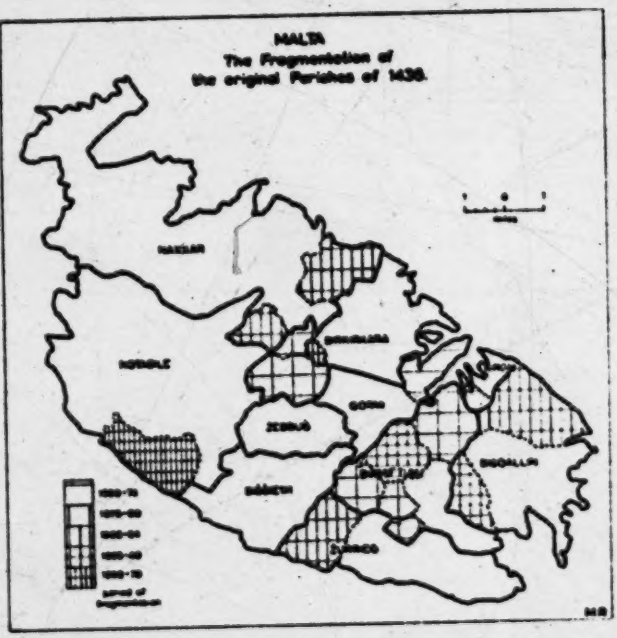

Fig. 38 The Fragmentation of the Original Parishes of 1436.

As early as 1836, a member of a Royal Commission was able to say that 'the real grievance of the Maltese lies beyond the reach of Commissioners and Governments, namely the excessive population'. At this date, as we have already seen, a steady increase of population had been maintained for some 300 years. During the nineteenth century, advances in medicine and sanitation together with increasing economic prosperity were reflected in a falling death rate and an accelerating natural increase. Thus between 1842 and 1956, numbers nearly trebled, rising from 114,000 to 316,000 and the overall density increased from 935 to 2,611 per square mile. While the rate of growth has in most European countries declined during the present century, that of Malta has remained at or above the levels of the nineteenth century. Only in the last few years has the Maltese crude birth rate begun to decline and only in the post-war period has emigration been on a large enough scale to act as a check on numerical growth. As will appear, neither of these simple facts gives any ground for optimism.

Fig. 37 shows the absolute growth of population in the Islands. In Malta, the rate of increase has been cumulatively high although during three past periods, first between 1861 and 1881, and later during the two World Wars, it declined to relatively low levels. Since 1948 the rate of growth has been consistently low and occasionally changed into absolute decrease. In Gozo, total increase has been smaller and fluctuations both larger and differently timed. Between 1861 and 1871 population increased remarkably rapidly, while between 1911 and 1921 there was an absolute decrease. Since 1948 trends have conformed with those of Malta.

Such absolute figures need consideration from several aspects. The economic background has already been considered. Details of distribution and structure of the population must now be examined.

1: Bowen-Jones et al. K-5 (1956-1958) 1961

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Malta

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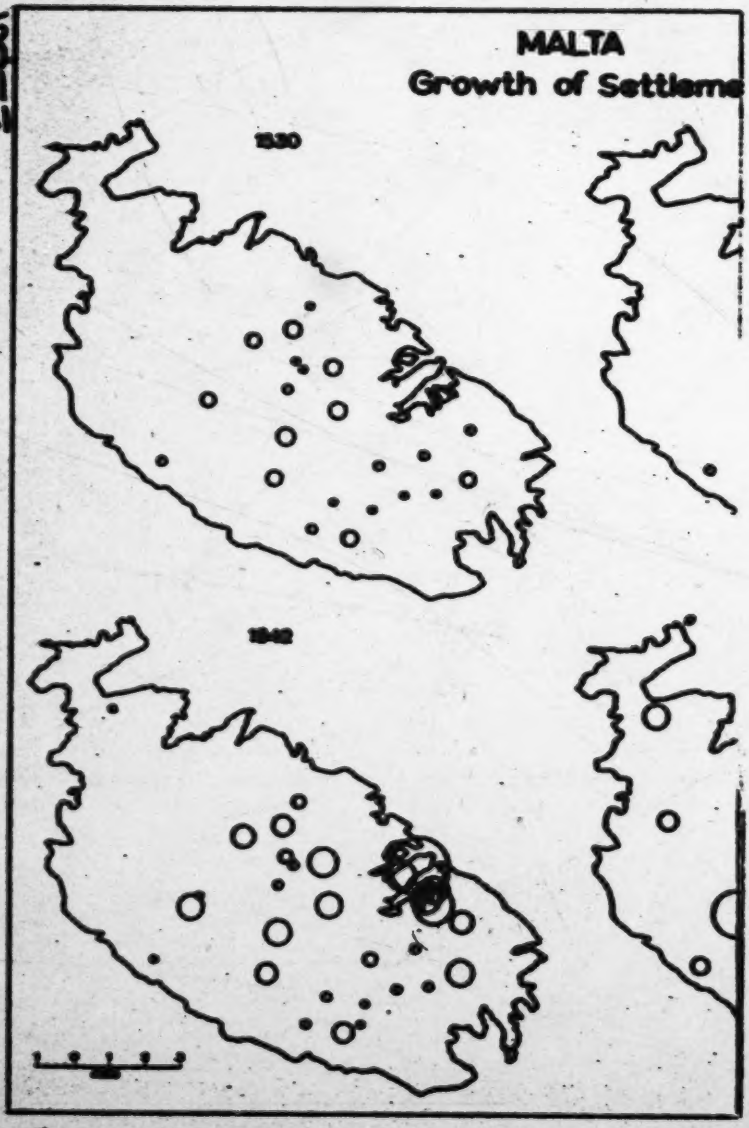

[p 139-A]

Fig. 38 Malta: Growth of Settlements

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Malta

[139-B]

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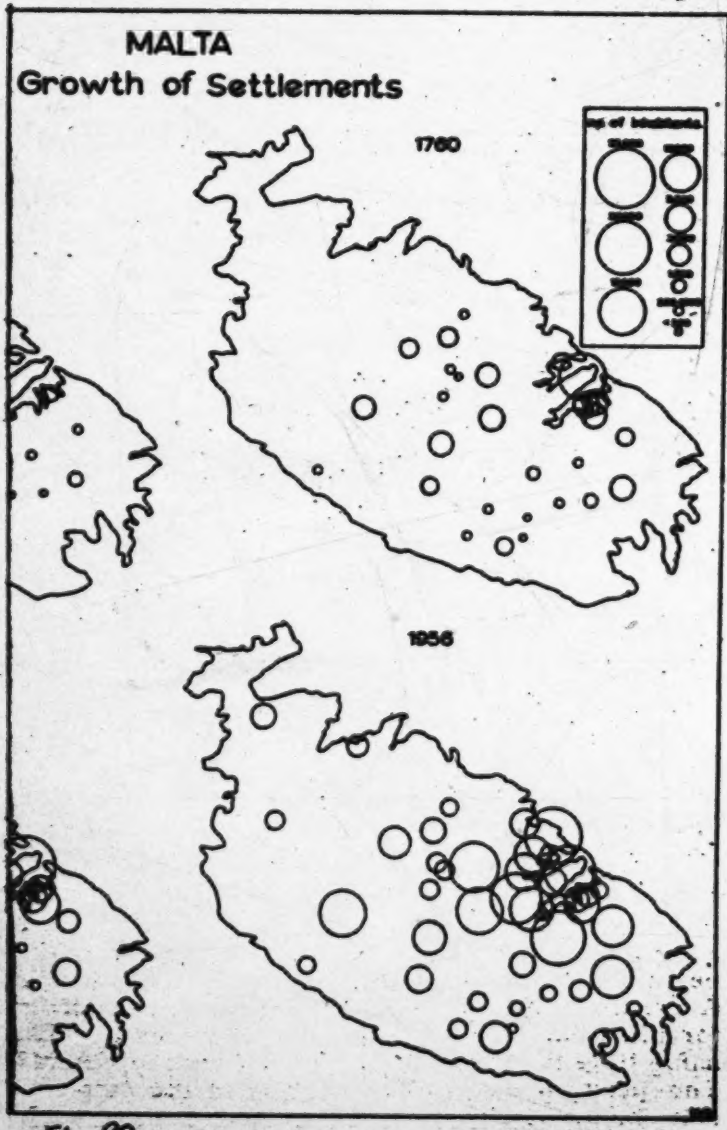

Fig. 39
Malta: Growth of Settlements.

[p. 139-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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POPULATION DISTRIBUTION

The main changes in population distribution may be easily established.

Before the arrival of the Knights, the population of the Islands was clustered in small inland villages while in the centre of each island was a fortified town where refuge could be sought in time of trouble. At the same time each island had its port. Thus, in Malta, Birgu (later renamed Vittoriosa) was the commercial centre while Mdina was the ecclesiastical and administrative capital. In 1436, there were 11 parishes in all: by the late seventeenth century the number had risen to 26 (Fig. 38). The establishment of these new parishes was largely confined to the central and southern parts of the Island; the north remained but sparsely peopled.

Under the Knights growth of population around the Grand Harbour and the vulnerability of Birgu to attack, as demonstrated in the Great Siege, led to the building of Bormla (Kospikwa) and Isla (Senglea) together with the new capital of Valletta on the previously barren Xibberas peninsula. The population of this city complex reached its high water mark in the early part of the nineteenth

[p. 139-C]
[TEST CONTINUES ON P. 140-C]

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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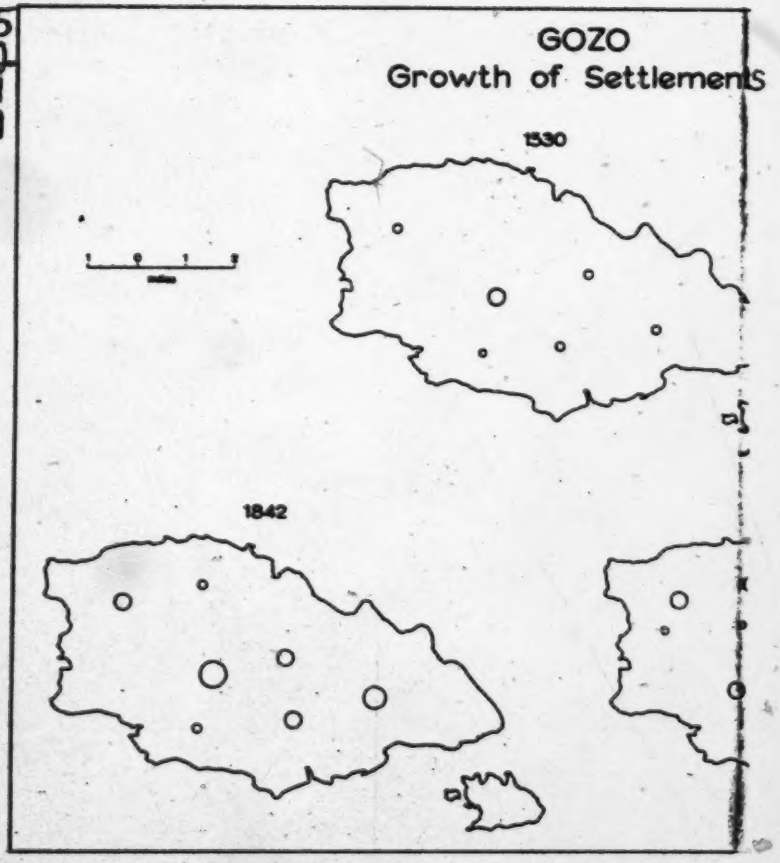

Fig. 40 Gozo: Growth of Settlements

[p.140-A]

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Gozo..

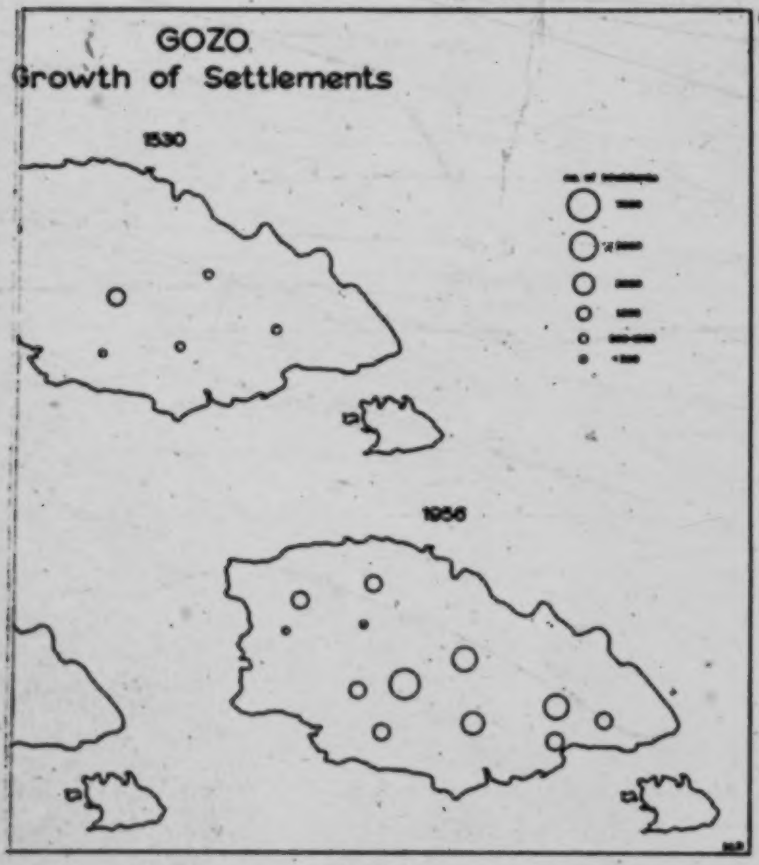

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Fig. 40 Gozo: Growth of Settlements.

[p. 140 -8]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

*175 century, since when the numbers living therein have declined appreciably.
161 A parallel development has been the spread of 'fringe' settlements outside the
361 fortifications accompanied by a transfer of population from the cities. At the same time there has been a persistent movement inwards from rural districts. The present century has also seen the establishment and growth of coastal settlement, notably around Marsaxlokk Bay, and the expansion of such northern villages as Mellieha, St. Paul's Bay and Mgarr, previously of little importance (Fig. 39).

Changes in the distribution of population and the development of new settlements have also occurred in Gozo where the hill top villages have grown ever-larger and where such places as Ghasri, San Lawrens and Kercem have become sufficiently important to warrant the establishment of new parishes. In contrast to Malta, however, the ancient citadel of Gozo with its suburbs in Rabat (Victoria) remains the capital and there has been no movement of the economic centre of gravity towards the coast (Fig. 40).

The difference between the rates of increase of the populations of Malta and Gozo, the former trebling between 1842 and 1956, the latter not quite doubling, is one indicator of the growing socio-economic differences between the two islands. A more useful distinction appears from a study of the functional and demographic characteristics of regional groups of settlement. By the mid-nineteenth century onward a conurbation with true urban functions had developed around the Grand Harbour, while to the west around Marsamxett and beyond, and on the southern and eastern city fringes were appearing suburban settlements in which non-rural residential development overwhelmed old village

[p.140-C]
[TEXT CONTINUES ON P.144]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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Key to Abbreviations used in Figs. 41 - 45

Fig. 41

M	=	Malta
U	=	Urban
S	=	Suburban
R	=	Rural
G	=	Gozo

Fig. 42

Va	=	Valletta
C	=	Cospicua
F	=	Floriana
S	=	Senglea
V	=	Vittoriosa

Fig. 43

Bk	=	Birkirkara
Gz	=	Gżira
H	=	Hamrun
Ka	=	Kalkara
M	=	Marsa
Ms	=	Msida
Pa	=	Pawla
Pt	=	Pieta
Q	=	Qormi
SV	=	Santa Vennera
SJ	=	Saint Julian's
Sl	=	Sliema
T	=	Tarxien
Za	=	Żabbar

Fig. 44(a)

D	=	Dingli
Gg	=	Għargħur
Md	=	Mdina
Me	=	Mellieħa
Mg	=	Mġarr
Mo	=	Mosta
N	=	Naxxar
Rb	=	Rabat
SP	=	Saint Paul's Bay
Sg	=	Siggiewi
Zb	=	Żebbuġ

Fig. 44(b)

A	=	Attard
Ba	=	Balzan
Bb	=	Birżebbuġa
Gd	=	Gudja
Gx	=	Għaxaq
Kk	=	Kirkop
L	=	Lija
Lq	=	Luqa
Mq	=	Mqabba
Mx	=	Marsaxlokk
Qr	=	Qrendi
Sa	=	Safi
Zt	=	Żejtun
Zq	=	Żurrieq

Fig. 45

Gb	=	Għarb
GM	=	Għajnsielem and Mġarr
Gs	=	Għasri
Kc	=	Kercem
Nd	=	Nadur
Ql	=	Qala
Rb	=	Rabat
SM	=	Sannat and Munxar
SL	=	Santa Lučija
X	=	Xagħra
Xk	=	Xewkija
Zg	=	Żebbuġ

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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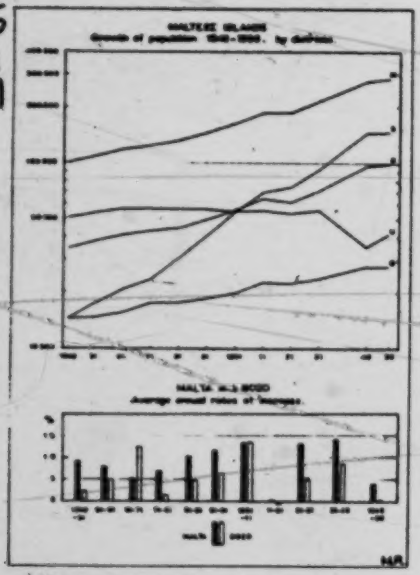

Fig. 41 Maltese Islands: Growth of Population, 1842-1956, by Districts.

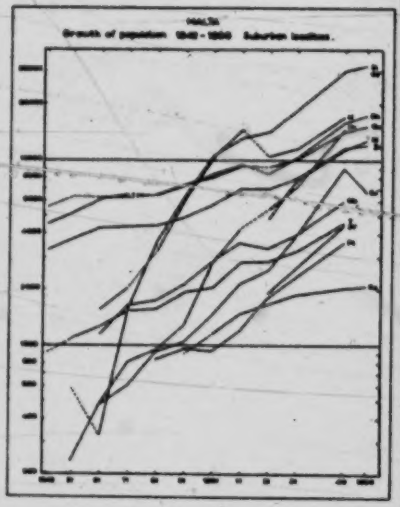

Fig. 43 Malta: Growth of Population 1842-1956, Suburban Localities.

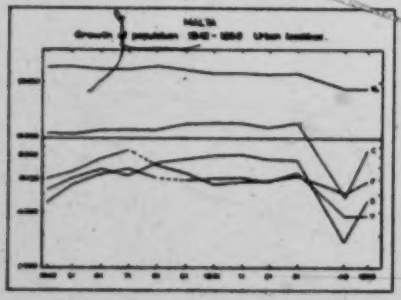

Fig. 42 Malta: Growth of Population 1842-1956, Urban Localities.

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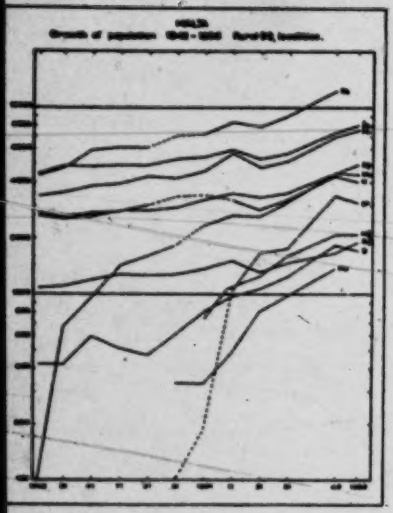

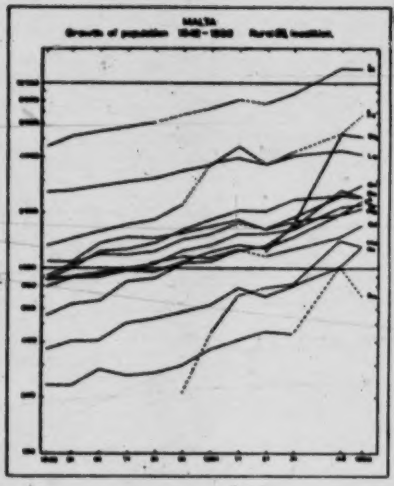

Fig. 44a Malta: Growth of Population 1842-1956, Rural (N) Localities.

Fig. 44b Malta: Growth of Population 1842-1956, Rural (S) Localities.

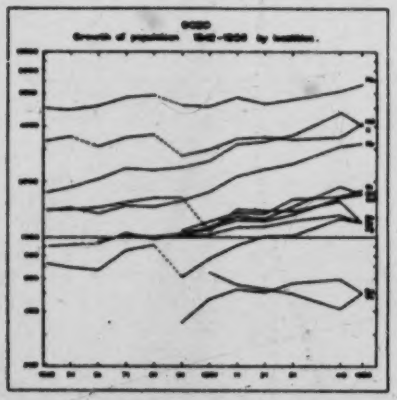

Fig. 45 Gozo: Growth of Population 1842-1956, by Districts.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

nuclei. Table 27 below shows how in numerical terms the regional population balance changed. It will be observed that the proportion of people living in the diminishing rural area remained remarkably constant, although as already noted in Chapter V, a growing number of these were not farmworkers. Equally noteworthy is the decline in residential importance of the urban nucleus compared with the rise of the suburbs, producing a complete proportional reversal between 1842 and 1956 (Fig. 41).

Table 27. Percentage distribution of population, Island of Malta.

	1842	1861	1881	1901	1921	1948	1956
Urban Districts	50.6	48.0	43.3	33.3	28.2	12.6	14.5
Suburban Districts	14.5	17.4	23.1	33.1	39.2	52.6	50.9
Rural Districts	34.9	34.6	33.6	33.7	32.6	34.8	34.6

Within this main pattern of distributional change, other small-scale but significant trends may be discerned. Among the urban areas (Fig. 42), Valletta's population was decreasing as early as 1842-51, but in other districts the decline did not set in until after 1871, while Senglea and Kospikwa continued to grow, albeit slowly, until 1911. During the Second World War, decline in numbers was most marked in the Three Cities while the population of Floriana actually increased. Since 1948, there has been a reversal of these trends, the populations of Senglea and Kospikwa growing more rapidly than that of Floriana, while Valletta and Vittoriosa showed little or no increase.

The most noteworthy distinction among suburban localities has been the differences between the older and newer centres (Fig. 43). Birkirkara, Qormi, Żabbar and Tarxien have all shown a slower rate of growth than the other nine localities, although in the case of Tarxien, now contiguous with the newer settlement of Pawla, increase has been quite rapid. The growth of Pawla, Hamrun, Sliema and St. Julian's has been the most striking feature of the period since the first Census. In 1842, these hamlets had less than 1,000 inhabitants while in 1956, they were the home of some 70,000 people, half the suburban population and one-quarter of that of the whole of Malta. The stagnation of Kalkara further illustrates the fact that second-stage suburban growth has been concentrated around and beyond Marsamxett Harbour rather than near the commercial and naval Grand Harbour.

Among rural areas too (Fig. 44) growth has been most rapid in the newer and largely non-agricultural settlements such as Marsaxlokk, Birżebbuga and St. Paul's Bay. A few villages, including Żurrieq, Kirkop and Mosta, showed rapid gains between 1901 and 1911 but lost a great deal of ground in the following decade when their rate of growth was much smaller than that of the newer settlements mentioned above.

In Goso (Fig. 45), the largest villages have grown least in recent years while smaller ones, such as Żebbuġ, have gained more rapidly. However, unlike Malta, Goso shows no great gains among the newer centres. San Lawrenz, for example, was created a parish in 1901 but suffered a steady decline in population from that date until 1948.

SEX AND AGE STRUCTURE OF THE POPULATION

From 1842 onward an excess of females over males has been characteristic of the population of the Islands (Fig. 46). Masculinity, as measured by the male: female ratio, has been consistently higher in Malta than in Goso. All the evidence suggests that this is a result of the persistent character of male emigration from the smaller island, whether to Malta or further afield. Within Malta some characteristic trends are observable. The masculinity of the urban districts has closely followed, though at a lower level, that of Malta as a whole.

1:Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

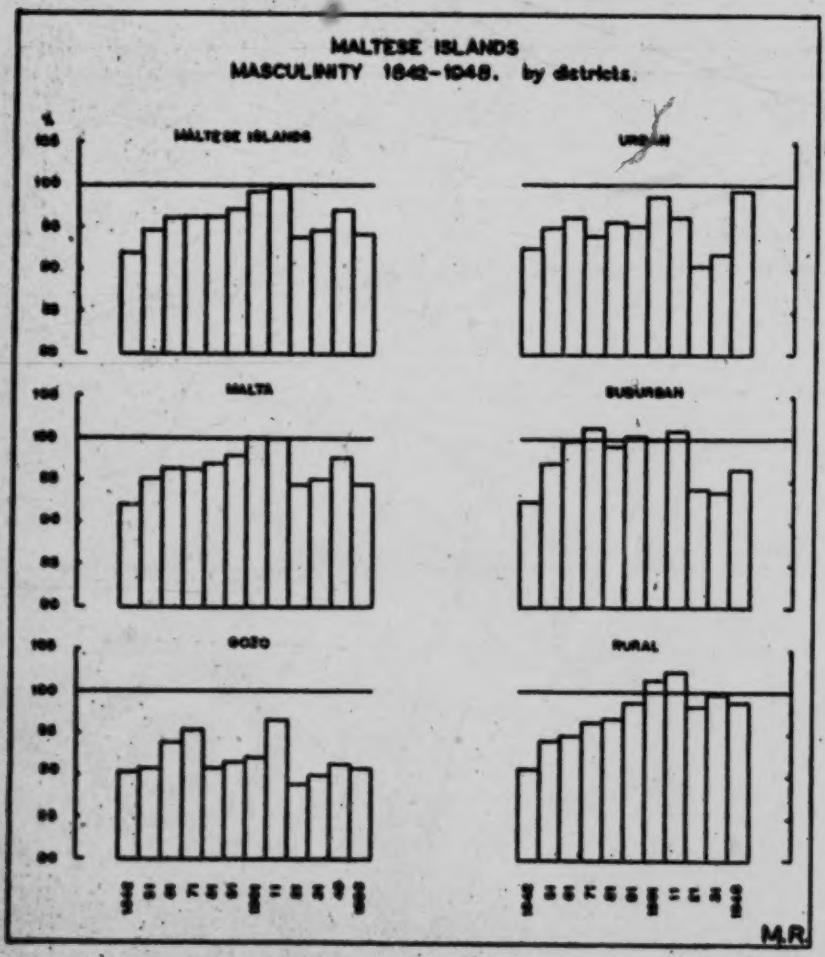

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Fig. 46 Maltese Islands: Masculinity, 1842-1948, by Districts.

[p. 145-A]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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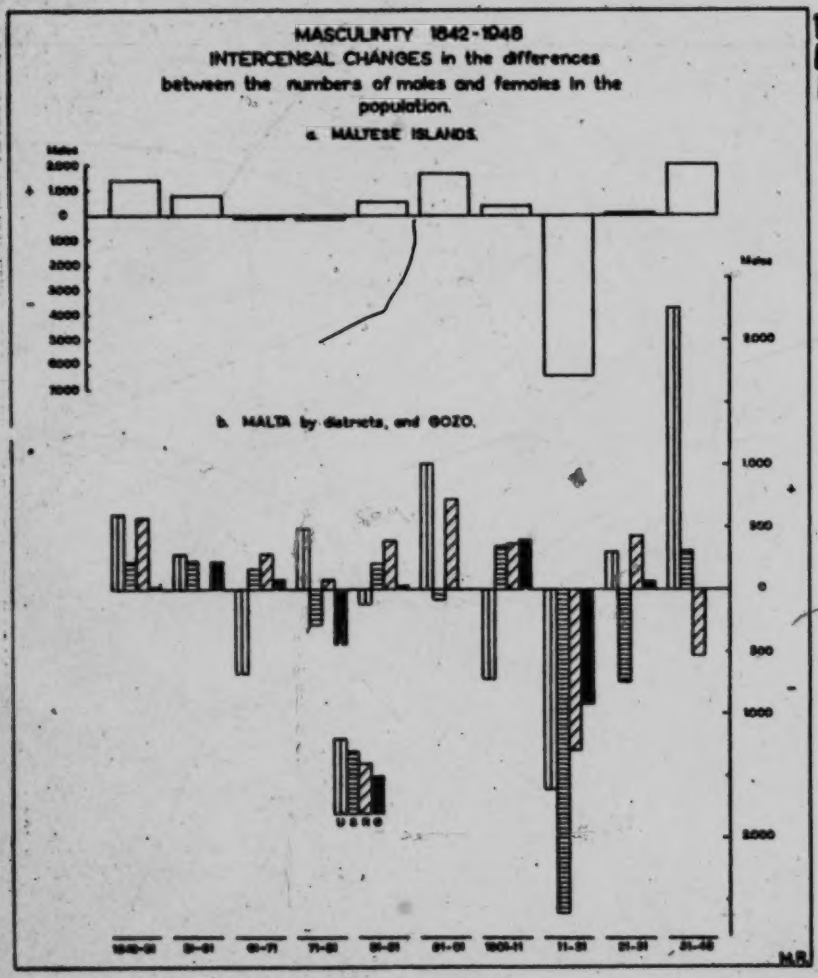

Fig. 47 Masculinity, 1842-1948.

[p.145-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

*175 Departures from the Island trend were most marked by a low masculinity in
162 1921 and an abnormally high ratio in 1948. In suburban areas growth of the
167 population as a whole, which was most rapid between 1861 and 1911, was not accompanied by any marked imbalance between the sexes but after the latter date low masculinity was persistent and the ratio fluctuated much less than in urban districts. In rural districts, masculinity increased steadily from 1842 to 1911, when 102.5, the highest ratio ever recorded in Malta, was achieved in these areas. After 1911, there was some decline, but rural areas continued to show a higher ratio of males to females than did the Island as a whole.

The sex structure of a population is closely connected with, among other factors, external and internal migration rates. We may therefore use masculinity ratios to help our general understanding of other socio-economic conditions and also vice-versa. The early appearance and continuance of an excess of females in the case of Malta is without doubt the result of predominantly male emigraton, a causative relationship particularly strong in slowly developing Gozo. By 1911, the cumulative effect of the return of male immigrants together with other factors brought the ratio to near-parity. After 1911, increasing emigration reduced masculinity to the low point of 1921 from which it again rose to 1948, since which time renewed and large-scale outward movement has once more reduced the ratio. Except for the special circumstances obtaining in the late 1930's when most of the female non-Maltese population (largely Garrison families) was evacuated, and in the mid-40s when a more balanced non-Maltese group became re-established; except for this, the sex ratio can clearly be understood in association with our examination of economic changes and with a study of emigration (p. 157 et. seq.).

16 Regional differences in masculinity are of similar value in elucidating
*175 changing patterns of economic development and of internal migration. The rising proportion of males in the urban population between 1891 and 1901, for example, was to a large extent a product of an inward movement of workers connected with harbour development, and the decline in masculinity which marked the succeeding decade reflects the cessation of such work. The increased urban masculinity recorded in 1948 suggests that the return to reconstructed areas was evenly balanced thus causing an adjustment in the ratio, moving away from the female preponderance of 1931 (Fig. 47).

Fluctuations in suburban sex ratios have been relatively slight. The fall in masculinity between 1911 and 1921 was largely a product of emigration, while that of 1921-31 is statistical rather than real in that, at the latter census, the 'civil population' included the families of the garrison among whom females predominated and who lived mainly in Suburban Districts.

In Rural Districts, increases in the proportion of males down to 1911, reflect an inward movement, largely of emigrants returning from North Africa together with the late arresting of the earlier male movement to the towns. Declining masculinity between 1931 and 1948 was largely a product of renewed movement to the towns, often a first stage in migration overseas.

162 The age composition of the Islands' population is especially characterised by the high proportion of children, as shown in Table 38.

Table 38. Age-distribution of populations in percentages.

		Under 15	15-64	65 and over
United Kingdom	(1948)	21.4	67.9	10.7
Italy	(1949)	26.5	65.6	7.9
Netherlands	(1950)	29.4	62.9	7.7
Malta	(1948)	34.8	59.3	5.9
Japan	(1950)	35.4	59.7	4.9

1:Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

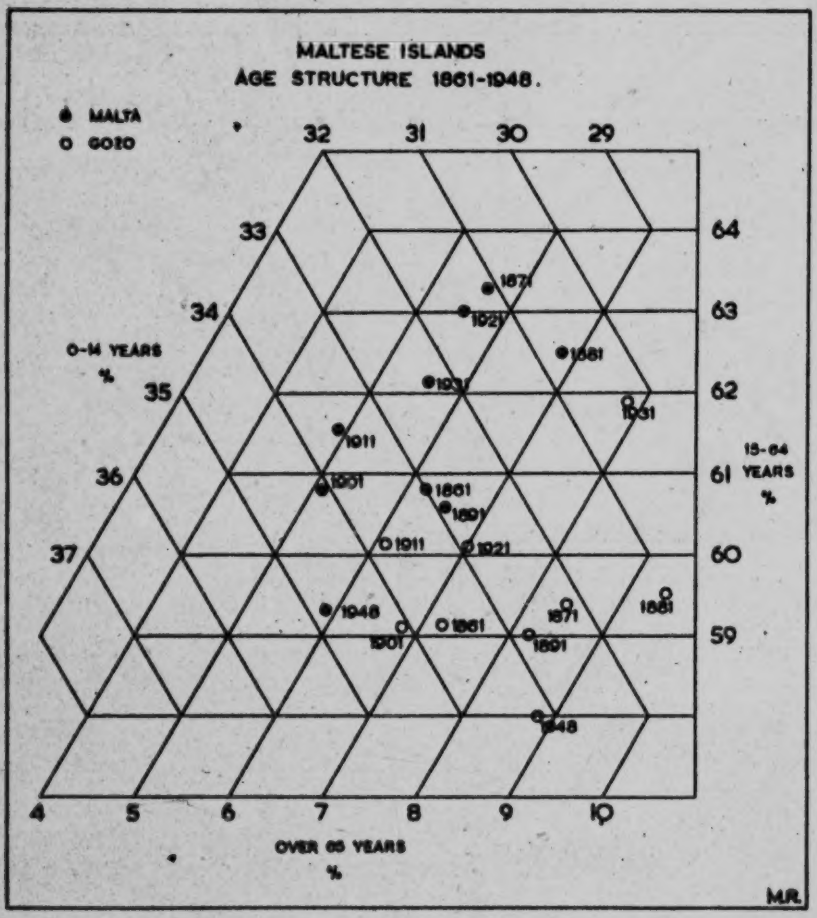

Fig. 48 Maltese Islands: Age Structure, 1861-1948.

[p. 147-A]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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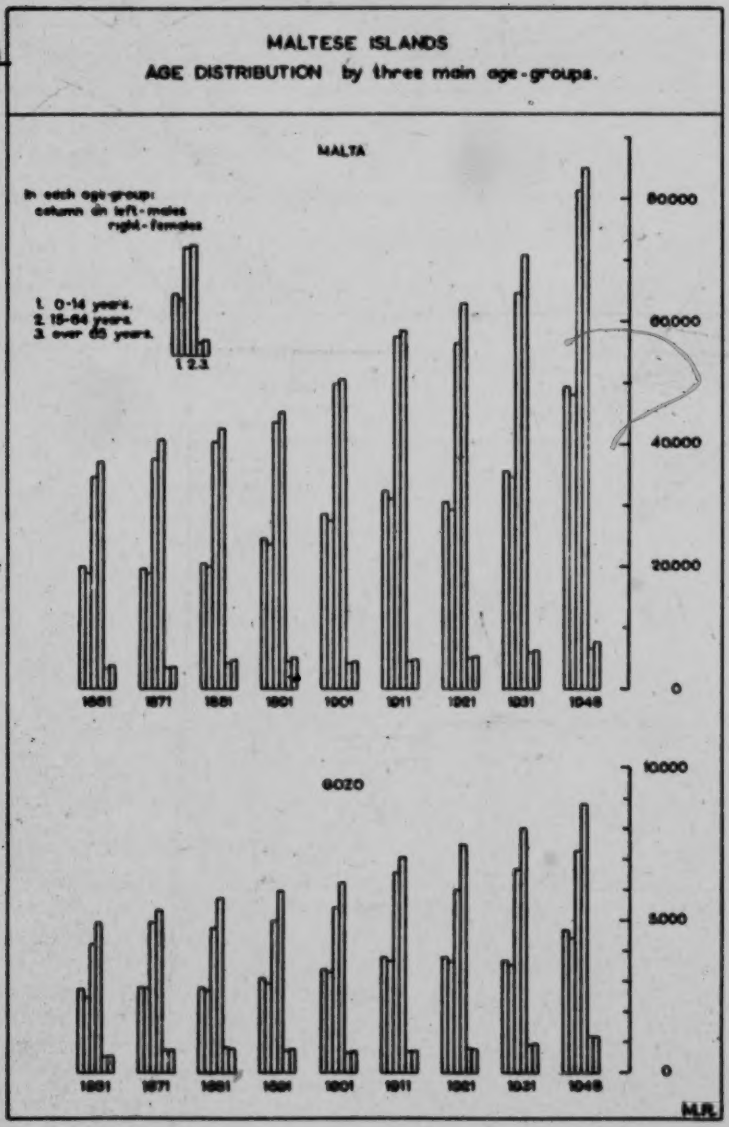

Fig. 49 Maltese Islands: Age Structure, 1861-1948, distribution by three Main Age Groups.

[p.147-B]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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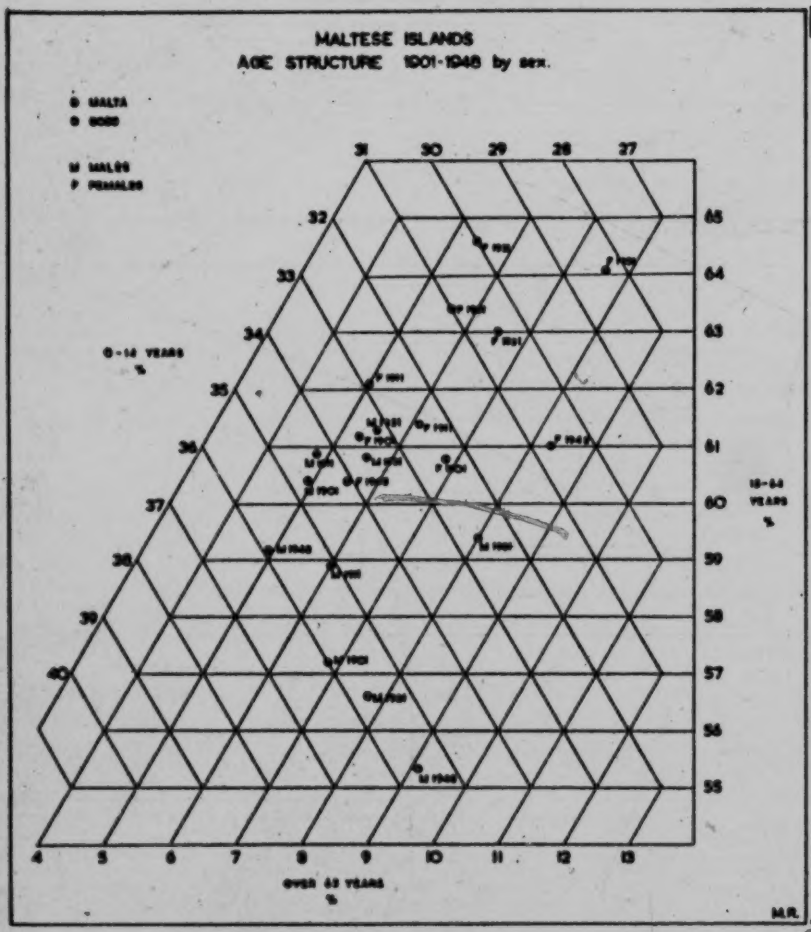

Fig. 50 Maltese Islands: Age Structure, 1901-48, by Sex.

[p. 148-A]

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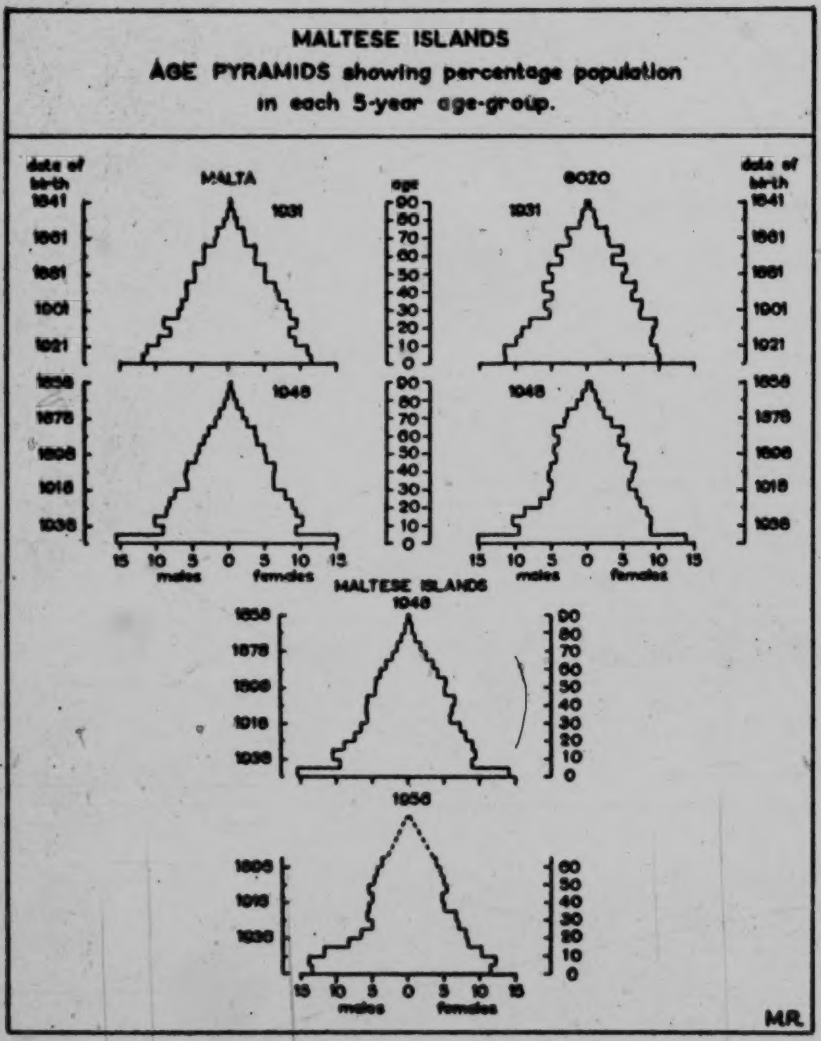

Fig. 51 Maltese Islands: Age Pyramids.

[p.148-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

The population of Gozo differs from that of Malta, having a higher proportion of people over 65 and a much smaller proportion in the 15-64 group (Fig. 48). Variations between the proportions in the main age groups are shown in Fig. 49, but few evolutionary trends are recognisable. There was a decline in the percentage of young children from 1891 down to 1931, but this was offset, particularly in Malta, by the post-war period when birth rates were high. In Gozo, the return of people to the Island from Malta and from abroad was reflected, in the 1931 Census, in a particularly high proportion in the 15-64 group, in contrast to the normal state of affairs. 162

The analysis of age structure by sex (Fig. 50) shows a consistently higher proportion of females than of males in the working age groups (15-64). That these figures are bound up with emigration is further corroborated by the more even balance between the sexes in the over 65 group.

In terms of actual numbers, children under 15 increased from 44,000 in 1861 to 106,600 in 1948 while the numbers of working age have grown from 80,700 to 182,600 and of old people from 8,200 to 16,800. The greatest relative increase has therefore been among the children but in their case there have been two distinct periods of numerical growth. Between 1861 and 1881, the group showed an absolute increase of only 4 per cent. In the next 30 years there was an increase of 57 per cent. This was checked in the period 1911-21, but followed by a further rapid increase between 1921 and 1948 when the number of children grew by 62 per cent. Throughout the whole period, the sex ratio remained fairly constant between 102 and 104 males per 100 females. The reasons for such fluctuations are best deferred to a later consideration of fertility rates.

Among the working age group, the rise in the number of women has been at a steadily accelerating rate, whereas that of the men fell sharply in 1921. The numbers over 65 declined in 1871 and 1901, but rose steadily at all other Census dates. Masculinity was least in 1921 (89) and highest in 1901 and 1911 (98). Among old people, the ratio of males to 100 females varied between 98 and 88 but showed no progressive trend.

The most recent developments in the evolution of the population are summarised by a comparison of the 1948 and 1956 age pyramids (Fig. 51). The large number of children who, in 1948, were less than five years old, had by 1956 been absorbed in the 5-15 age groups, but the proportion of under-five's in 1956 was well below that in 1948. The other most striking feature is the very small proportions of the 15-45 age groups in 1956, indicating the wastage, most marked among males, which is a product of emigration.

FAMILY SIZE

The Census of 1948 is the first from which a precise calculation of family size can be made. Previous estimates were generally to the effect that 'the average family is of four of five children'. Information from the Family Census of June 1955 (21) has not yet become available. 163

In Malta, more than half the married women have borne four or more children and in Gozo nearly two-thirds. An extraordinarily high proportion, 13.5 per cent. in Malta and 16.4 per cent. in Gozo, have ten or more. Such figures do not, however, represent the total number of births which may take place, and Table 29 shows the number of women by cohorts of completed fertility who have had various numbers of children.

Table 29.

Number of children	Great Britain 1946		Maltese Islands 1948
	a	b	c
None	10.3	17.3	11.3
1-3	48.2	63.6	17.8
4-9	37.8	18.6	45.0
10 and over	3.7	0.6	25.9
	100%	100%	100%

a = women married between 1900 and 1909 - R.C. on Pop. 1949-50, Vol. 2.
b = women married in 1925 - R.C. on Pop. 1949-50, Vol. 2.
c = married women over 45 years of age - Census of 1948.

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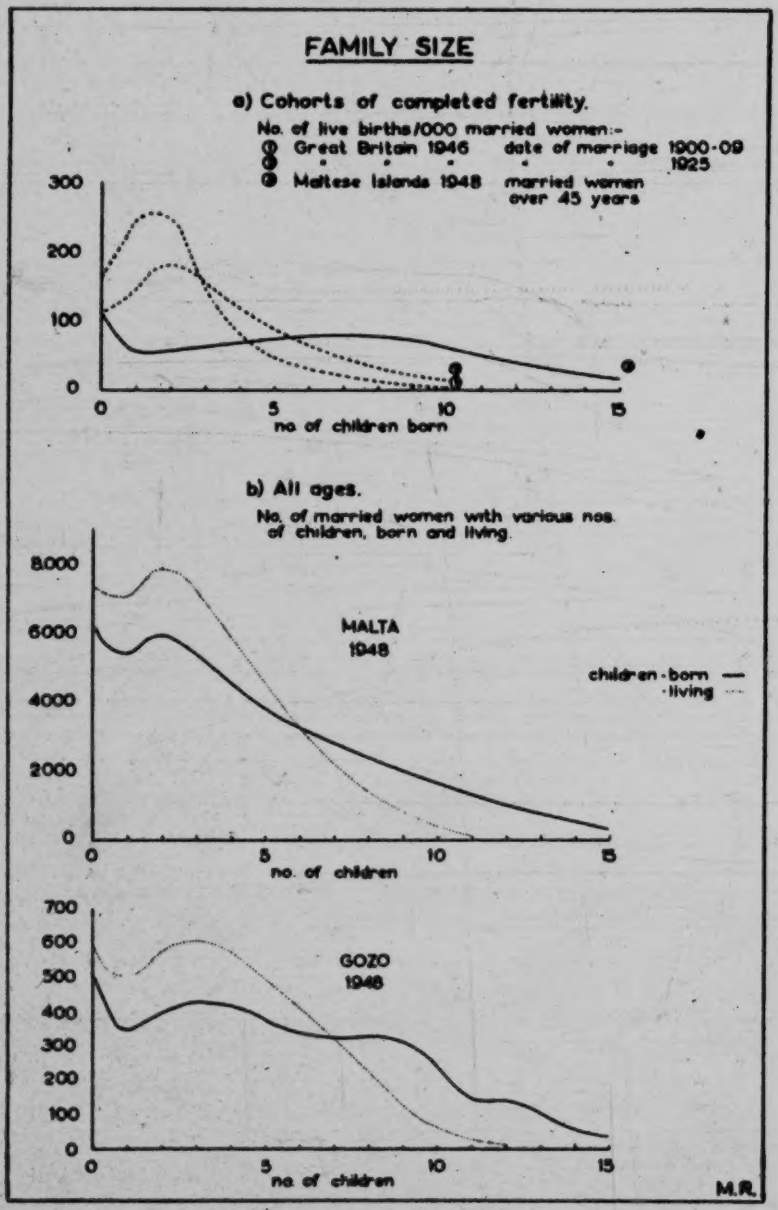

Fig. 52 Family Size.

[p.150-A]

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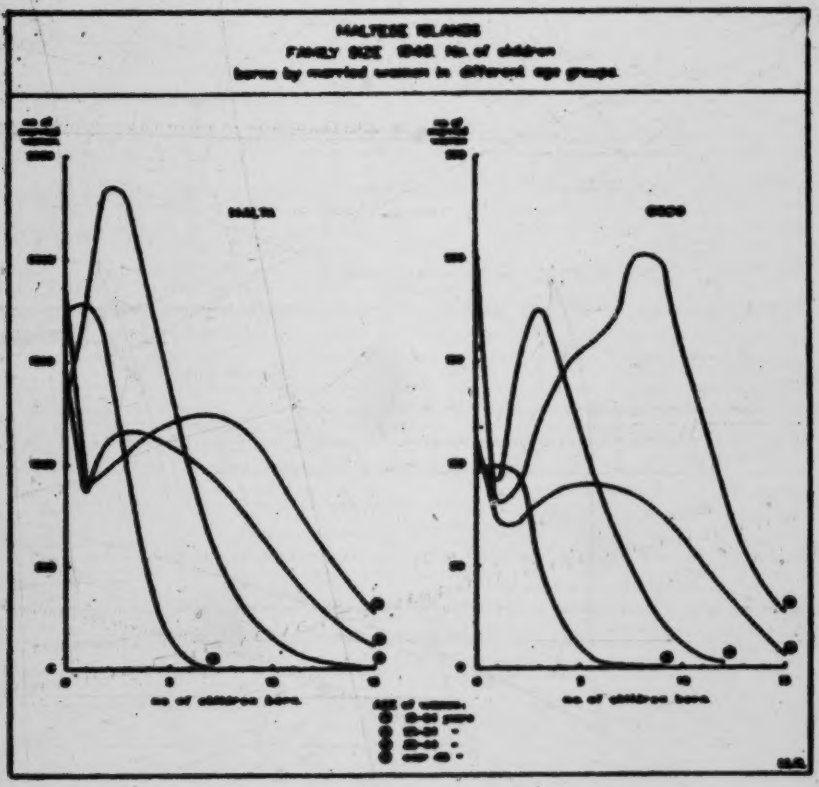

Fig. 83 Maltese Islands: Family Size, 1948.

[p. 150-B]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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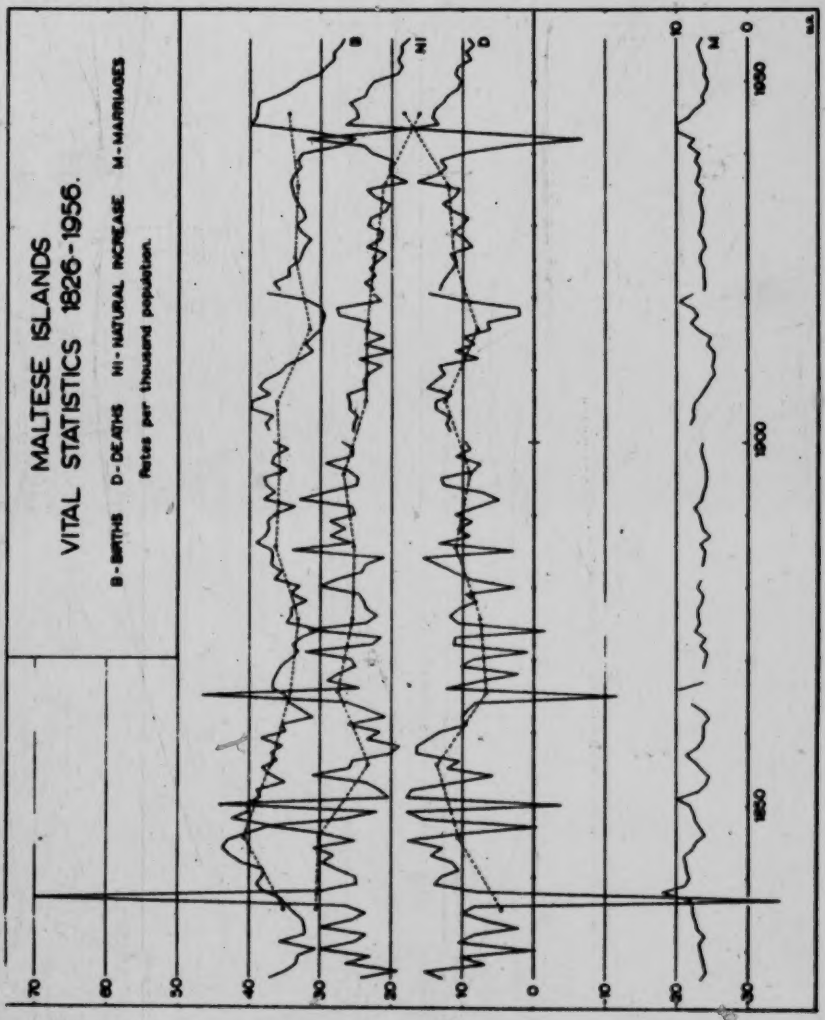

[p. 151-A]

Fig. 54 Maltese Islands: Vital Statistics, 1826-1956.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

16 This table summarises the data illustrated graphically in Figs. 52 and 53, and shows that 70 per cent. of Maltese women eventually have four or more children and 25.9 per cent. have at least ten.

The survival rate is discussed later (p. 153) but the 1948 Census does show the proportion of children born who were still living at the time of the Census and adds a further perspective to the statement of actual family size. Deaths reduce the mean number of children per married woman from 4.8 to 3.2. Effective family size has in the past been reduced mainly by the extraordinarily high rate of infant mortality. In recent years this has been checked and larger families can be expected unless adjustments operate in the birth, marriage or fertility rates in the immediate future. Past trends in these rates, which contribute to the natural increase are considered in the following section.

ELEMENTS OF POPULATION GROWTH

161 Since changes in population are a function of births, deaths and migration, the trends of each of these and their relative contributions to growth must be considered. In the 114 years between 1842 and 1956, there was a net increase [167] of just over 200,000. In the same period, nearly 70,000 people have been lost by migration and the natural increase has amounted to some 267,000.

[p. 151-B]

[i.e., Table 29, p. 149 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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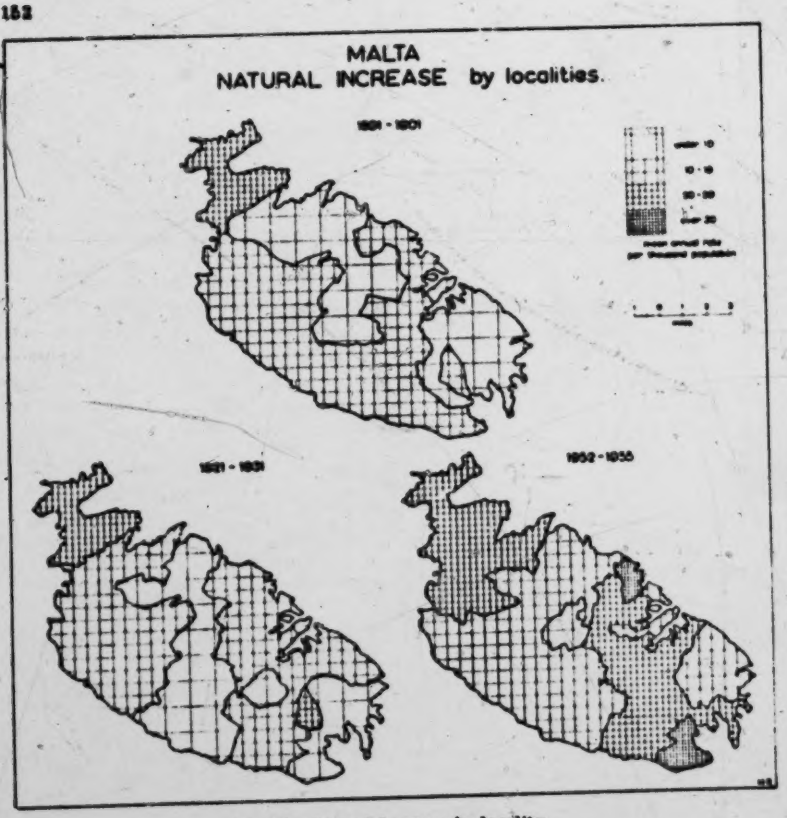

Fig. 55 · Natural Increase by locality.

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BIRTHS

The crude birth rate in the Islands has remained between 30 and 40 per thousand over almost the entire period since 1826. Only in the 1840's did it exceed 40 and since then it has remained well below that figure. In 1917 and again in the Second World War it fell below 30, but a permanent downward trend has only been established during the last decade, bringing the birth rate below 30 since 1952 (Fig. 54).

The overall trend has thus been one of decline. This began after the peak of the 1840's and continued until the 70's. There was a reversion to higher rates during the last two decades of the nineteenth century which was carried on until 1906, but the next four years brought unemployment and depression, foreshadowing the trough of the 1914-18 War. This was followed by a recovery to 38 per thousand, but the rate soon fell again to remain around 33 until the Second World War. A marked decline in the period 1940-43 was followed by a rise in 1944 to levels above anything experienced since the 1850's and these were maintained until 1948. Since then, decline has been rapid and sustained. With the sole

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

exception of 1942, there has been no recorded instance of a birth rate as low as 26.5, which was the figure for 1958. 163

In the late nineteenth century, Maltese birth rates were comparable with those of southern Europe, but subsequent decline has been much delayed in Malta. Economic progress in the Islands during the late nineteenth and early twentieth centuries was accompanied by a rising rather than by a falling birth rate. The pattern of natality in Malta since 1911, however, conforms to trends experienced elsewhere in Europe, although the rates themselves have not been the same. The decline in the Maltese birth rate during the 1914-18 War was less marked than on the European mainland and there was an actual increase in Malta between 1919 and 1938, when other European rates declined. The post-war upsurge in births reached its peak early in Malta and while the birth rates of most European countries have been stable at a medium level over the last few years, that of Malta has been falling from the most recent peak. 163 171

DEATHS

The decline in mortality during the past few years has been even greater than that in births. Before the Second World War, the Maltese death rate had fallen below 20 on but three occasions and in 11 separate years it had exceeded 30. Since 1953 it has stayed consistently below 10, thus becoming directly comparable with the death rates of the most advanced Western European countries. 165 [171]

In the nineteenth century, the Maltese death rate was subject to violent annual fluctuations. The worst years were those of epidemic cholera, but even in the latter part of the century, when this was less common, the rate remained high. The main factors responsible were poverty, disease and unsanitary living conditions which were particularly reflected in high infant mortality. Improvements in drainage, sewerage and water supply were effective in reducing mortality from nearly 27/1,000 in the 1890's to 21 in the 1930's but much greater reductions were achieved once the problem of infant mortality was attacked. As recently as the 1920's, this was still as high as 250 per 1,000 live births and only in 1936 did it fall below 200. The decline in this rate was further delayed by the Second World War but by 1944 it had fallen to 114. Since then, progress has been rapid, and infant mortality in 1958 stood at 40 per 1,000 live births, a level comparable with those of many European countries.

Thus, in Malta, as in other European countries, the death rate has been reduced largely as a result of declining infant mortality and the reduction although late has been extremely rapid. A further decline is both possible and, on humanitarian grounds, desirable.

NATURAL INCREASE

Statistics of births, deaths, marriages and natural increase are illustrated in Figs. 54 and 55. In the years since 1948, the natural increase has reached its highest level because of a remarkable decline in the death rate. The absolute natural increase in the decade 1831-40 was 3,241 whereas in 1941-50, despite the low birth rate of the war years, the excess of births over deaths was 52,833. The current natural increase runs at about 5,000 a year, ten times that of a century ago. 161

The annual rate of natural increase in 1831-40 was less than 5 per 1,000; by the end of the century it had reached 10 and in 1941-50 it was 18, since when it has maintained the present rate of 19. The general upward trend has not been an even one as the graph shows, there being peaks in 1851-60, 1881-90, 1901-10 and 1941-50, of which the first and last were the highest. The former was a period of high birth rates, a moderate death rate and very early marriage; the latter was one of rapidly falling death rates and a post-war upsurge in births. The troughs in the curve were lowest in the early and mid-nineteenth centuries, corresponding to times of frequent sickness and epidemic, of which the late 1880's and early 1870's provide examples.

Annual fluctuations in natural increase reflect specific historical events. On six occasions, the number of deaths in a year has exceeded the number of births. In 1837, '47, '50 and '55, epidemic cholera was the cause. In 1874, a

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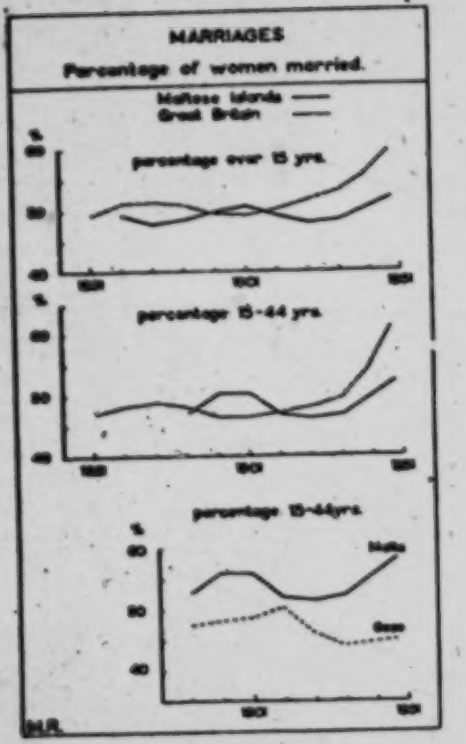

Fig. 56 Marriages: Percentage of Women Married.

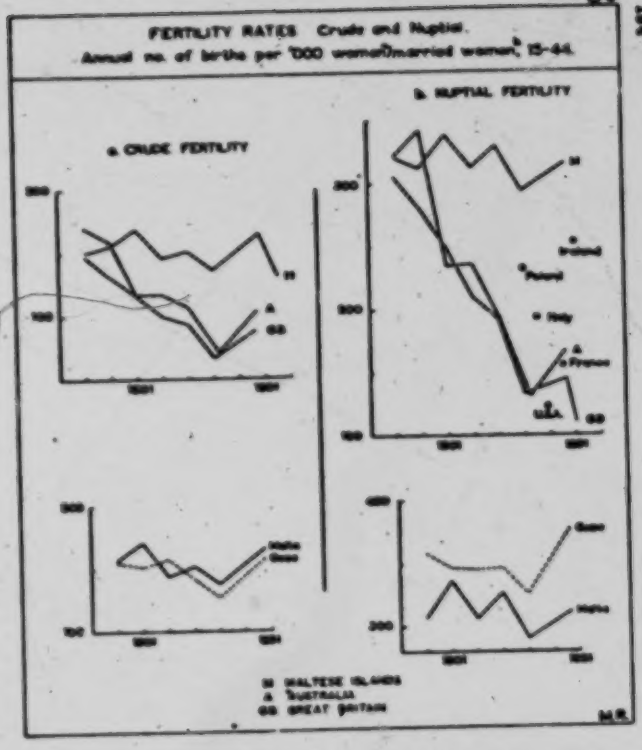

Fig. 57 Fertility Rates: Crude and Nuptial.

1: Bowen-Jones et al. K-5 (1955-1958) 1961 EZ6 Malta EZ6

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

variety of diseases, among which smallpox and cholera were important, assumed epidemic proportions after several years in which sickness had been prevalent. In 1942, war casualties, malnutrition and disease were responsible for an excess of deaths over births. 161

CONJUGAL CONDITION (Fig. 56) 162

The proportions of single, married and widowed persons has remained virtually the same since 1901. The great disparity between the numbers of married men and married women resident in the islands, a feature of the inter-war period, reduced the number of effective marriages, but the discrepancy was considerably reduced by 1948, when there were 97 married men to every 100 married women, as against 92 in 1921 and 1931.

Comparison with other countries indicates that a smaller proportion of the Maltese people marry than is the case in, for example, Britain, Ireland or Australia but the age of marriage in Malta is much lower than in most other countries. Nearly 80 per cent. of the men who marry do so before they are 30 and, in 1955, 90 per cent. of brides were below that age. (In England and Wales the comparative figures are 74 per cent. and 81 per cent.) Furthermore, 26.2 per cent. of Maltese brides are less than 20 years of age. In Gozo, marriages are fewer, proportionally, than in Malta, and take place later: although there is a higher proportion of brides below 20, the proportion of women married by the time they are 25 is similar in the two islands. The commonest age at which men are married is 25 in Gozo compared with 22 in Malta. 162 582

MARRIAGE AND FERTILITY

While the proportion of the population which is married is relatively low, the resulting depressing effect on fertility rates is more than neutralised by the early age at which women are married. Crude fertility rates alone form an insufficient basis for detailed demographic analysis. Changes in the sex ratio, in migration, and in marriage rates as well as the underlying socio-economic attitudes to family size all must be examined. 162 582 163

The marriage rate has declined since the early nineteenth century. In 1831-40 it was 8 per 1,000 of the total population, while in 1951-56 it was 6.4, having fallen below 7 in the 1850's and remaining below that level with the exception of the two post-war periods (Fig. 54). Annual variations have followed changes in economic conditions as was the case in the rising marriage rate soon after 1900. Plagues, epidemics and wars have generally been followed by a sharp rise, as was the case after World War II.

A high marriage rate, maintained for several years, is generally an indication of prosperity. This was so in the first five years of the present century, while the depression which culminated in the arrival of the Royal Commission in 1911 was accompanied by a fall to less than 5 per 1,000. The high marriage rate of the years immediately following the Second World War soon fell away, but since 1950 there has been an unexpected recovery which has not been matched by a comparable rise in the number of births.

It is possible to assess the fertility of the population by a comparison of the Censuses with Vital Statistics and by relating the number of births either to the number of women of childbearing age (crude fertility rate) or to the number of married women of childbearing age (nuptial fertility rate). Crude and nuptial fertilities are shown in Fig. 57 and in both cases comparisons made with British and Australian equivalents. It will be seen that, in the Maltese Islands, between 1881 and 1948 the crude fertility rate only fell below 130 once (in 1931) and generally fluctuated between 140 and 170. In 1948 it was 175, the second highest figure recorded, but by 1950 it had declined to 130 despite a slight increase in the marriage rate. This would seem to indicate that nuptial fertility is now on the decline, though this cannot be demonstrated statistically.

The comparison of nuptial fertility rates is more valid than that of crude rates since it makes allowances for differences in the marriage rates between various countries. By this type of assessment, the outstandingly high fertility of the Maltese population is even more strongly emphasised. Only once, in 1931, 163

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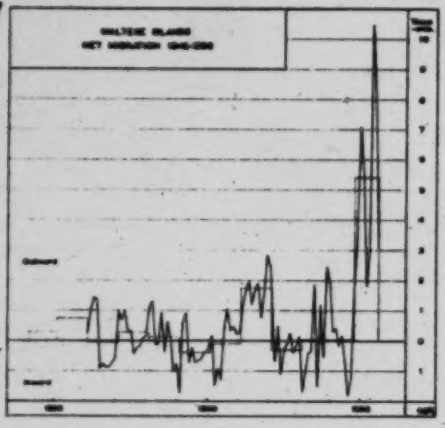

Fig. 58 Maltese Islands: Net Migration, 1842-1956.

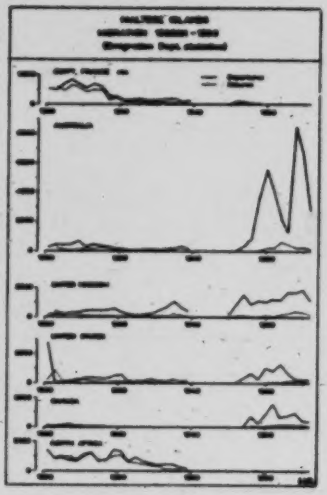

Fig. 60 Maltese Islands: Migration, 1930/31 - 1956.

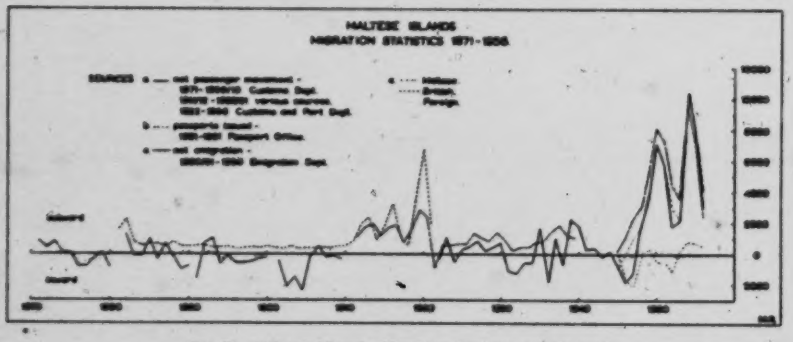

Fig. 59 Maltese Islands: Migration Statistics, 1871-1956.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

has the nuptial fertility rate fallen below 300 and it is now 25 per cent. higher than that of Ireland, reputedly the highest in the world (22).

Fertility, marriage and birth-rates have been outlined above, but the trends of the first two do not account for decline of the last. Fertility is stable, or was until 1948, the marriage rate has not declined since that year and previous trends of nuptial fertility do not suggest any imminent decline. One strong possibility, however, is that the pattern of post-war migration is concealing a decline in the married population. Many migrants from the islands return to get married and leave with their brides for their new homes. Their children are born overseas so that marriages which have been registered in the islands give rise to children born and registered abroad. If this is so, it indicates that a decline in the rate of emigration would result in a rapid revival of the birth rate and that the present pattern of natural increase is very much affected by the trends of emigration.

MIGRATION

The pattern of nineteenth century migration has been the subject of close study by Price (23) who deals mainly with the period 1842-81 using as his major source of information, the records of the Passport Office. Since the Department of Emigration was not established until after the First World War, the intervening period has been filled in for this study by interpretation of further Passport records and of passenger movement statistics collected by the Customs and Port Department. From 1918 onwards statistics of the Emigration Department have been used along with those of the Customs and Port Department.

Comparability of material has been one of the biggest problems. In the period covered by Price, the native Maltese population only was considered; subsequent statistics are for the entire civil population, which from 1901 onwards included the families of the Garrison. The best check on the scale of movement is provided by a consideration of the Census reports together with vital statistics for inter-censal years. The difference between the net increase in population and the natural increase represents the inter-censal net migration.

Table 30. Inter-censal migration 1842-1958.

Period	Natural Increase	Net Increase	Net Migration
1842-51	11,310[1]	8,620	- 2,690
1851-61	17,470[2]	10,060	- 7,410
1861-71	7,860[3]	8,490	+ 630
1871-81	11,030[4]	8,180	- 2,850
1881-91	16,490	15,260	- 1,230
1891-1901	15,830	19,710	+ 3,880
1901-11	26,030	27,080	+ 1,050
1911-21	17,360	-110	-17,410
1921-31	25,280	28,260	+ 2,980
1931-48	65,140	64,370	- 770
1948-58[5]	53,480	10,250	-43,230

1-4. Price, op. cit.
5. Estimate from the Census of 1948 to 31st December, 1958.
1842-81. Maltese population only.
1881-1901. Civilian population excluding Garrison families.
1901-1958. Civilian population including Garrison families.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

A graph covering the last hundred years (Fig. 58) shows inter-censal net migrations and annual variations in the scale of movement as indicated by passports issued and by the Customs and Port Department records. The latter are adjusted for each decade to make the sum of annual totals comparable with the inter-censal net totals shown in Table 30 (see also Fig. 59).

In the nineteenth century, the principal factors affecting the scale of migration were economic. Periods of poverty at home sometimes drove the Maltese overseas while at other times they were attracted by boom conditions elsewhere in the Mediterranean. During the Crimean War, not even prosperity at home could counteract the cotton and building boom in Egypt and emigration rose to record heights (24). But the end of the Egyptian boom coincided with depression in Barbary and the two resulted in returns to Malta which more than compensated for the outward movement of the 50's and 60's. In the 1870's, recovery in Barbary coincided with slight recession in Malta and the number of emigrants again increased only to diminish again in 1875-80, reflecting bankrupt conditions in Egypt (25). The economic position of the receiving countries therefore played an important part in determining the volume of emigration at any given moment.

An outstanding feature of nineteenth century movement was a series of attempts to organise emigration from the Maltese Islands. The first of these ended with the failure of the Guiana and Granada experiments of 1831-41 when plantation settlement in these areas was attempted (26). Subsequent plans to settle colonies in Cyprus, Australia and the Americas collapsed and various other attempts to establish Maltese communities overseas each failed in turn. As a result, over 90 per cent. of nineteenth century emigrants moved no further than the coasts of North Africa and the Levant.

The restricted scope of movement and the choice of the Mediterranean seaboard for settlement was influenced by three main non-economic factors: 'the belief that America and Australia were the permanent homes of strange and deadly diseases; the belief that it was necessary to settle in a country near enough to Malta to allow easy and frequent return to the beloved homeland; and the belief that similarity of language and custom marked out North Africa as the divinely appointed region for Maltese settlement abroad' (27).

The annexation of Tunis by the French in 1881 was an indication that the Maltese would no longer find North Africa an open field and the competition in business and commerce from the French and Italians became severe. Moreover, the standard of living in Malta from the 1860's onwards was higher than in most other parts of the Mediterranean so that there was little incentive for the Maltese to go there. Furthermore, the 80's saw the expansion of employment opportunities at home with the introduction of a number of schemes involving large scale public expenditure. As a result of such developments, the period from the late 1880's until 1905 was one in which there was a net inward movement. All thoughts of migration were abandoned and in 1905 the labour shortage was so acute that 300 workers were brought in from Sicily, Italy and Spain. 1906 saw the completion of major harbour and dockyard works and unemployment then became a serious problem which was partially responsible for the visit of the Royal Commission in 1911 (28). Since French and Italian control of North Africa was then complete, attention had to be paid to movement further afield.

In 1907, on the basis of experience already gained and during the period of depression, a voluntary organisation known as the Malta Emigration Committee was formed. In spite of the approval shown by the 1912 Royal Commissioners, this body was neither given any official status nor superseded by any official organisation. Partly as a result of the difficulties confronting the Committee, a Brazilian venture failed miserably in 1912, and in 1916 an unhappy combination of circumstances provoked such Australian antagonism to migration to that continent that an embargo on future movement was established which prevailed until 1920.

In 1918 the need for adjustment to post-war conditions became sufficiently great to force the establishment of an Emigration Department charged with the control of movement and the selection of personnel (Fig. 60). The social aspects

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

of the Selective System were of considerable importance. The main receiving countries were formulating restrictive laws and imposing quotas on entry. The physical, educational and social backgrounds of intending emigrants therefore needed considerable attention. Of the prospective emigrants in the early 1920's, 90 per cent. were illiterate and apart from apprenticeship schemes in the Dockyard there existed no opportunities for vocational or technical training. It can be assumed that only an infinitesimal number of migrants possessed any capital. Casolani, the Superintendent of Emigration between 1918 and 1930 claimed that the sudden realisation of the need for educating and training intending emigrants was most salutary in that it clearly showed how the existing educational system had - 'for a century been absolutely unrelated to the present needs of the people' (28). Since 1920, vocational training courses have been developed, a Migrants Training Centre opened in 1927, and more recently an Industrial Training Centre. In 1956 nearly 1,000 students were attending evening classes and many utilising other schemes. Ironically enough, by the 1950's the burden of expenditure incurred in the training of people who were to use their skills elsewhere, now began to prove in itself a major problem.

The direction of emigration since 1920 is illustrated in Figs. 60, 61, 62. Briefly, the major trends may be outlined as follows. Short-distance migration to Europe and North Africa declined rapidly and returns increased during the 1930's of economic dislocation and increasingly restrictionist policies in the receiving countries. The United States, Canada and Australia by various quota schemes reduced the inflow from Europe and that part of Maltese long-distance movement via the mainland as well as direct was struck a final blow by the 1930-31 world slump. The most rapid revival took place in movement to the United Kingdom where Maltese status as British subjects ensured preferential treatment. Economic conditions in all other areas other than Australia prevented any other revival before World War II destroyed all possibility of movement.

During the war, continued population growth and obvious hardships and insecurity pointed to emigration as a desirable action and led to official preparation for a post-war exodus. By the end of December 1946 nearly 12,000 prospective emigrants had been registered of whom over 10,000 wished to go to the U.S.A. and Australia (in roughly equal numbers). Until 1948 shipping shortages, administrative difficulties and the presence of a housing problem in Australia, together with a boom in domestic demand for labour in reconstruction work, slowed down the actual rate of movement. At the same time pressure kept building up and by March 1949 there were 42,120 registered prospective migrants.

In that same year financial assistance to would-be emigrants was made available on a significant scale. As from 1947 the Maltese Government contributed to a Passage Assistance Scheme whereby 75 per cent. of the cost of passage would be provided to 'suitable, necessitous and deserving cases with good prospects of employment abroad', a scheme more generous in its coverage than that available in 1948 from the Emergency Unemployment Loan Scheme. With effect from the beginning of 1949 the Passage Assistance Agreement concluded between Malta and Australia made available more capital than Malta alone could supply but, in that the equal grants made by both Governments were each limited to £50 per capita, a greater onus was placed on the migrant. Even so during 1949 nearly three and a half thousand people left for Australia under passage assistance schemes and in 1950 this rose to nearly 5,000, a proportion in each case of over 90 per cent. of all assisted emigrants. Between 1951 and 1953 economic difficulties in Australia reduced the strength of attraction to that country and a relatively greater proportion of movement was direct towards Canada.

By 1953, Australian economic revival and a firm acceptance of an emigration policy by the Maltese Government foreshadowed an impending increase in emigration and the United Kingdom Government agreed to alleviate the personal and Budgetary strains in Malta by making a contributory grant of up to £200,000 towards the Passage Assistance Scheme. By 1956, 60 per cent. of all expenditure on assistance was being borne by the United Kingdom Government, 10 per cent.

[Text continues on p. 160-C]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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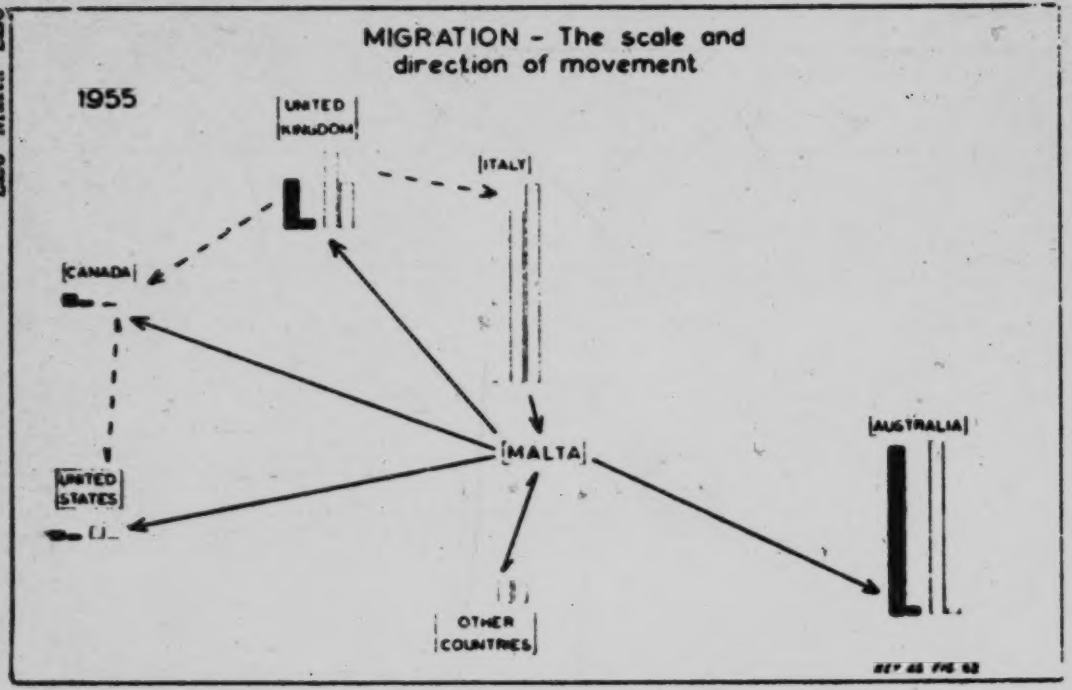

[p. 160-A]

Fig. 61 Migration: Scale and Direction of Movement, 1955

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Fig. 62 Migration: Scale and Direction of Movement, 1956.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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by Australia, and 30 per cent. by the Maltese Government. In addition, the Colonial Development and Welfare Fund has helped to finance vocational training schemes. Even so, as already noted, the burden and the irony of training and sending away that part of the population which potentially is the most productive has been keenly felt in Malta. In 1954, 11,000 emigrants left the Islands, 9,793 under Passage Assistance Schemes, over 8,000 of these for Australia. Since 1955, the policy of encouraging emigration has been implemented less vigorously and the rates of departure have become strongly influenced by political dictates. The social and demographic repercussions of fluctuations in policy need no especial emphasis here.

In conclusion, we may consider the regional variations in emigration. Traditionally, movement tended to be from the countryside into the towns and thence outward from Malta. Exceptional was Gozo in that from villages such as Nadur a direct exodus was already well established in the nineteenth century. The position in recent years is shown in Fig. 63. The three regions with the highest emigration rates each have distinctive characteristics. The North is a newly-settled agricultural region. From its still relatively youthful population with a high birth rate, a larger than average proportion is fitted by reason of age and absence of ties for emigration. The south-eastern district of Birżebbuġa

[p. 160-C]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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and Kalafrana have also been centres of inward movement, and moreover have a higher than average proportion of skilled labour associated with Naval stations. The last region, that of suburban Malta stretching from Tarxien to St. Andrew's, is an area of transit to some extent, an area of urban and relatively mobile life, and as such is the type of region from which on *a priori* grounds one would expect high rates of exodus. 167

In some ways more noteworthy, and of particular direct interest in association with other of our findings, is the relative immobility in Central Malta, that belt of country stretching from Fomm ir-Rieh, across the Mdina-Rabat Uplands, across the long-settled good farmlands of the Central Region eastwards to St. Thomas' Bay. In this heart of old rural Malta, least directly affected by the changes characteristic of the last four centuries, the extreme course of emigration makes the least appeal.

POPULATION INCREASE IN RELATION TO RESOURCES

Between 1842 and 1905 the population of the Islands increased by 86,000 from 113,864. By 1947 it had grown by a further 100,000, an increase of 50 per cent. in 42 years. During the last decade the rate of increase has considerably diminished. 161 168

Behind this bare statement lie a number of important facts. We know that the rate of increase before the date of the first census was very high, extremely so when we remember the incidence of disease and corsair raids. As noted on p. 136 the rate of increase in the island of Malta during the rule of the Order was greater than that of Gozo during the last century. Moreover, it is probable that for some three or four centuries previous to the arrival of the Knights the rate of increase was comparable to those of the later periods.

It seems likely, therefore, that for perhaps 800 years, the Maltese population has increased at a fairly consistent and high rate up to 1947 (see too Section IV). It also seems probable that net emigration, although regionally variable, did little to relieve the steadily growing pressure on resource. We know, for instance, that of the total loss by migration of 67,000 between 1842 and 1956, 43,000 left after 1918. We also know that crude mortality rates dropped but slowly before 1943 and that infantile death rates declined markedly only after this decade. There is therefore no obvious vital revolution, no sudden upsurge in numbers, no simple formula, to be invoked in the explanation of the growth in Malta's population.

From a consideration of the demographic history of the Islands, in terms of political, economic and cultural changes and against the background of the landscape palimpsest, one is forced to strange conclusions, viz. that the concepts of 'over-population' or 'optimum population' have no historically valid meaning in a Maltese context. As we have seen in earlier chapters, there has always been considerable Island contact with neighbouring lands. During the period for which we have any historical record a great part of the wealth on which Malta has lived has come from outside. The historical sequence of population growth appears in Micawberish terms: something has always turned up, either a new external valuation or a new possibility of marginally increasing resource wealth, in time to prevent real 'over-population' appearing. This hypothesis is considered more fully in the concluding section but it is worth noting here that each historical conquest has *ipso facto* been made by an increasingly world-conscious power, by a more enterprising society, and each has led to the creation of wider opportunities for the gaining of wealth. Similarly, each intervening period of doldrums has been marked by improved ability to intensify the exploitation of internal resource, generally in the agricultural sector. Thus, in the eighteenth century the cotton boom, in the mid-nineteenth century livestock improvement and land reclamation, in the twentieth century modernised irrigation and dairy-farming, and more recently horticulture and the search for oil.

Up to the present time fortune has smiled and there has been no fall in living standards as might be expected in consequence of extreme over-population. Yet, during historical times at least, the population has always been too great for self-sufficiency and in this sense has always been over-large. The rather

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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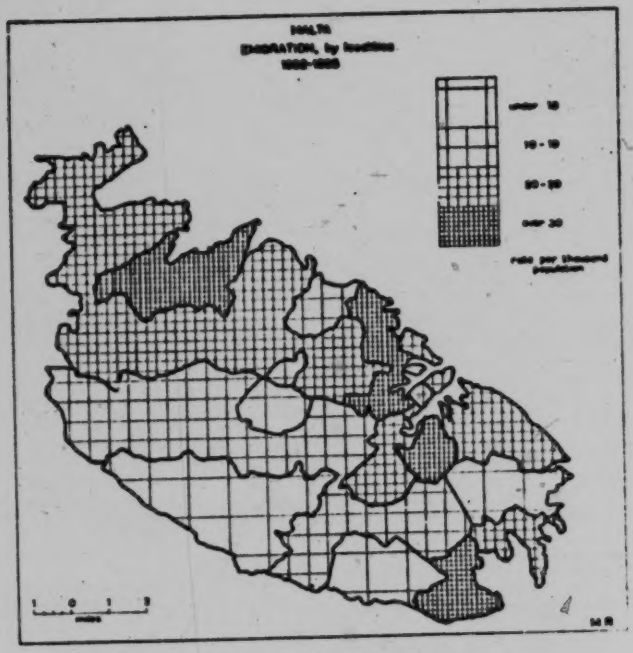

Fig. 63 Emigration by Localities, 1952-55.

161 puzzled note made by the Royal Commissioners of 1911 would seem to be
168 applicable to the whole of our period: 'We cannot but conclude that the Maltese people as a whole are by no means a destitute population seeing that they continue to absorb and pay for imports of considerable value over and above those which may be said to be paid for by the exportation of the products of the Islands' (30).

The obvious question of whether this process has now reached its limit is bound up with our analysis of the contemporary situation. For a decade or so, there has been a substantial overspill of population in emigration and the birth rate has declined, (p. 153). The present apparent equilibrium is however most unstable. The rate of emigration itself is only to a limited extent controlled by
[167] economic forces and is bound to fluctuate. If the 1948-56 rate of natural increase were maintained and emigration discontinued, the total population of the Islands would leap up another 100,000 over the 1947 level to 400,000 by 1968. Moreover and as noted on p. 157 the nuptial fertility rates reveal that the rate of natural increase could rise even higher than at present if the indirect effects of emigration disappeared. To what circumstances can the concept of a population optimum be referred? Quite obviously the term has no relevance either to the known past or hypothetical future in that historical experience has so conditioned Maltese attitudes the even now there seems general confidence that a continued population inflation can be maintained.

168 Demographically considered these are facts of observation; socially and economically they are the factual basis on which future policies must be based.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Our consideration must be restricted to the self-imposed terms of reference laid out in the Introduction, an examination of the resources of the Islands and their utilisation, bearing in mind the decreasing likelihood of there occurring more falls of manna.

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Plate XIII. The Grand Harbour, Malta.

Plate XIV. Mgarr Harbour, Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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B. Economy and Trade

In any schematic division of history into periods there must be dangers and difficulties. Nevertheless, some themes of significance to our present study, naturally as well as for reasons of convenience, are best treated in this way. It is impossible to be precise about the date of birth of modern Malta in that different land marks might well be used in pursuing different lines of thought. Thus, constitutionally the year 1921 is of most significance, while the Royal Commission of 1911 is in some ways an economic obsequy for nineteenth-century Malta. In the sections that follow, therefore, arguments cannot be chronologically in step. Moreover, this, our last period, is the most well-documented of all and the irregularity of coverage most considerable. Some of the arguments earlier developed need little further emphasis in that some conditions and attitudes firmly established by the beginning of the twentieth century need merely to have their survival confirmed and readers referred to relevant material. Henceforward, therefore, our treatment can legitimately be more selective.

This period of Modern British Malta must be further subdivided. The first phase drew slowly and uneasily to a close during our period of research. It was formally ended by the suspension of the constitution in 1958. The new constitutional proposals of 1960 mark the official beginning of a second phase. The interregnum was the period of the transference of the Naval Dockyard to a civilian firm of ship repairers. In that we attach the greatest importance to the study of the fundamental infrastructure on which Maltese life has and will be based, most of the following analysis is concerned with the first phase - the climacteric of British rule in Malta. Our comment on more recent happenings is therefore deliberately restricted.

The Census of 1912 noted that in the decennial period 1901-11 ... 'productiveness has not risen in proportion to the increase of the population'.

The recorded Civil population in 1911 was 211,564. While in 1901, 28 per cent. of the female population was gainfully occupied, ten years later the proportion had fallen to 20 per cent. Henceforth male employment alone was of significance. The male labour force, which for analytical purposes was regarded as excluding only the age-group below five years of age, totalled 92,529. Of these almost 12,000 were engaged in agriculture, 19,489 in commerce and transport, and over 21,000 enumerated as having 'industrial' occupations. 31,385 were returned as unoccupied or unproductive.

The opening quotation is strictly an actuarial statement based on demographic facts. Behind the Census figures however we may perceive, by using various pieces of evidence, an economic basis for its sombreness. By comparing details of the 1911 enumeration with those for 1921, the first year in which unemployment within occupational groups was recorded, we may deduce that some 10 per cent. of the able male labour force was in fact without employment during the earlier year. By 1907, 10 per cent. of the ships cleared from Malta left in ballast (1). Between 1901 and 1911, the numbers of farmers and farmers' relatives assisting on the land increased by 3,000 and the number of labourers fell by 1,259 (2). Only once between 1906 and 1914, in 1908-09, did Government Revenue not show a deficit (3). In 1905, 9,175 men were employed in the Naval Establishments but this had fallen to 5,181 in 1906 (4). Many such facts could be quoted to prove the existence of an economic depression in Malta during the years following 1906, a situation which induced the setting up in 1911 of a Royal Commission to consider the financial situation. The array of evidence does more than this, it also shows that this was no simple secular trend but a sign of uneasy adjustment to new circumstances, an adjustment that is still in progress. This is why the Report of the 1911 Commission is of more than contemporary importance (5) and why its study is essential to any serious consideration of Maltese problems.

Bowen-Jones et al. K-5 (1955-1958) 1961
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433 458 The main relevant conclusion was unmistakably ominous: 'Government expenditure has more than made up for that of the Knights, and has diverted more of the labour of the population to the service, direct or indirect, of the foreign government which applied it to purposes entirely Imperial and unconnected with the special interests of the colony. Doubtless this expenditure has led to immediate prosperity... but the basis of this prosperity is artificial and precarious' (6). It is possible to argue the degree of validity of the third premiss of the first clause but the general truth is undeniable. This general picture is so clear that in this particular chapter attention will be focussed only on some aspects of the Maltese economy as it has developed during the last 50 years.

43 The changing character of Maltese Trade is well evidenced in the annual reports of the Customs and Port Department. Before World War I, Malta was still of some importance in Mediterranean transit trade, particularly for goods destined for North African and Levant ports. Between 1910 and 1922 the annual average weight of such merchandise handled was 17,000 tons (7). This activity almost disappeared during hostilities and after a short post-war boom settled down at a new low level handling only some 3,000 tons of merchandise. In part this was due to the elimination of the important German and Austrian connection which, in a Report published in 1919 (8), was the subject of much hostile Maltese comment. More important was the fact that the gap thus left was not filled by other foreign or local interests. The Maltese writers of the 1919 Report were not able to obtain their desire 'to have a company formed by a few merchants, who would thus teach Maltese capitalists that the investment of moneys in industries and especially in shipping is more profitable and better for the Islands and for the capitalists themselves, than the investment in doubtful securities or in reckless speculation'. The fundamental difficulties of expanding port [504] activity have remained. Malta, for all the grandiloquence of the name 'Grand Harbour', has until very recently possessed but poor physical facilities for handling shipping. All vessels of over 2,000 tons have had to be worked by lighter, and civil repair facilities as well as warehousing have been extremely limited. In that the needs of the Fleet have been paramount this is understandable; the consequences have been deplorable. The absence of enthusiasm for [454] local investment of Maltese capital has been equally inhibiting. There survives, even intensified during the 1930's, a traditional feeling of insecurity which was succinctly noted by a banker giving evidence before the 1911 Commission: 'There is plenty of money in the Island... there is not much trust, I think' (9). Even now, while the rate of saving in Malta is very high - c. 14 per cent. of total personal income, too large a proportion of the savings are invested abroad - some £70 millions. Given this basic insecurity, which still appears in conversations with business men and which is so deeply rooted as to be very difficult to remove, development is difficult. Moreover, since the Maltese for an island [208] people are singularly non-maritime in character, and, in conditions no more difficult than in many other parts of the Mediterranean, have almost ignored the fishery industry (10), there exists no traditional basis for marine affairs. In these circumstances the value of the handing over of the Naval base to British civilian firms, and the policy of attracting foreign (mainly British) manufacturing concerns, thus making available both facilities and most of the capital, is on economic grounds indisputable.

439 457 One other aspect of port and trading activities must be examined, the nature and balance of imports and exports. The changing character of world trade in the first place has vitally affected the nature of Malta's entrepôt activity. By 1956, the value of re-exports had reached over two and a half million pounds, of which one and a half million represented mineral fuels and lubricants, mainly aviation spirit and turbine fuel (11). This is still the pattern today. Of Malta's transit trade in re-exports, by far the biggest proportion is concerned with supplying the Garrison in its new and more mobile form. The imbalance between retained imports and domestic exports remains essentially similar to that observed very much earlier and is best examined in conjunction with other economic elements.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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For brevity's sake it must suffice to say here that, apart from the obvious effects of World War II, the Maltese economy during the last 50 years has developed along more or less uniform general lines. Trade statistics began to be compiled properly in 1908-10. By 1918, visible exports paid for only 10 per cent. of all imports while by 1956 this proportion had dropped to 5 per cent. For our present purpose the most recent specifically economic Report utilising normally unpublished source material, that of Balogh and Seers (13), may be used as a basis for discussion. Statistics for the year 1953-54 contained therein and in the original source material are here re-assembled and re-arranged in the same combinations used in Chapter V A, i.e. Negotiable Income or External Economic Balance, Internal Revenue and National Product. By no means all the facts are available and some of the elements in the computation are open to question, but this particular presentation has been adopted to bring out significant points of direct relevance to our work.

The first element, that of External Balance may be presented in tabular form thus:-

Table 31. External economic balance, 1954.

A. Negotiable Income - originating externally.		
(i) Services pay	£6.5	millions
(of which dockyard)	(3.6	")
(ii) Direct expenditure by Services	2.2	"
(iii) Estimated spending by non-Maltese Service personnel	6.0	"
	£14.7	"
(iv) Imperial Grants	3.0	"
	£17.7	"
B. Negotiable Income - originating internally.		
(i) Merchandise exports	£1.5	millions
(ii) Invisible exports	2.9	"
	£4.4	"
C. Negotiable Income - Grand Total	£22.1	millions
D. Expenditure on Imports.		
(i) Merchandise imports	£18.6	millions
(ii) Invisible imports	1.9	"
	£20.5	"

The most obvious characteristic of Malta's economy in its external relationship is its amazing dependence for Negotiable Income, i.e. convertible wealth available for paying for imports, on factors outside domestic control.

In detail various significant points emerge. While part of this income resulted from the provision of industrial and labour services - A (i) and (ii), about 40 per cent. came through retail and domestic services to the Garrison - A (iii). Statistically, this is an item impossible to measure precisely, and in so far as it is a residual item a further question arises, to wit, how far may it be an over-estimate concealing an unrecorded inflow of foreign wealth through hidden channels to the civil population. In Sierra Leone, periodic upsurges of

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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434 unrequited imports were indicative of illegal diamond smuggling. It may well be that, in Malta, a less spectacular movement of capital is similarly responsible
457 for part of the residual items of foreign income. Even so, and considered in a later examination of Internal Revenue and National Product, the implications of a national reliance on this and other elements of income are manifestly significant.

439 If we turn to a consideration of the merchandise in trade, the instability of the situation becomes even more strikingly obvious. An analysis of trade of the Maltese Islands in 1953 (13), the year in which economic conditions for 1954 would be established, shows the following salient points. Britain and the Commonwealth supplied half of Malta's imports thus leaving some £10,000,000 of the remainder to be covered by British credit with other countries. Of the domestically originating exports of three-quarters of a million pounds, only £266,000 went to non-protected markets outside the Commonwealth. These and other details suggest that the Maltese Islands as a whole, not only the Garrison therein, represent a not inconsiderable drain on British reserves of foreign currency. This appears even more strongly from a consideration of the classes of imported merchandise. Imports of Food, Drink and Tobacco (F.D.T.), totalling £7,800,000 were of almost precisely the same value as imports of Manufactures. The Mediterranean Maltese islands naturally depend on imports for main supplies of dairy products. Almost all the £161,188 expended on butter went to the Commonwealth but nearly half of the value of cheese imports - £305,000 in all - came from Italy. Another £161,000 went on eggs, and £785,000 on processed milk. Alarmingly enough however even Mediterranean products were and still are imported in surprisingly large quantities. £130,000 on edible oils, and £353,000 on vegetables, one-third of the latter represented by tomato preparations, are such large sums as to need justification of local inability to produce these commodities. When one notes that, in a Class distinct from the F.D.T. group, a further £1,241,000 was expended on livestock fodder, then one begins to wonder whether agriculture is practised at all in the Islands. There seems no doubt that many of the fresh or processed food and fodder commodities now imported could properly be produced in Malta by better resource use. There remains one difficulty. It is probable that the Knights subsisted mainly on imported products of higher quality than those produced locally. Since 1800, and this is a sign of rising living standards, social emulation has been able to spread this effect through the greater part of the population. The trade figures for later years merely confirm what may be observed directly that most Maltese for one reason or another will deliberately choose foreign rather than domestic produce where possible. In 1956 this led to the consideration of quasi-sumptuary regulations; to us it is a factor in the social environment quite as important as many elements in the physical environment.

652 If we turn to a consideration of the Internal Revenue Account we see how
434 deep-rooted and extensive are those characteristics of the economy already noted.

Thus of Government Revenue approximately one-third was derived directly from outside Malta (C) as a result of activities originating outside the control of the Maltese people. Of the remaining two-thirds (D), the largest part was *indirectly* also so obtained from activities dependent on expenditure by non-Maltese, in that it came from taxation of profits earned by mercantile services to the Garrison, taxation of wages, salaries and industrial profits earned by other services rendered to the Imperial power, and lastly from Customs levies on the goods paid for by external income. This revenue (D) was not in itself in any case large enough to cover ordinary expenditure (A) let alone supply capital for public investment.

434 Many other questions could be raised, e.g. is not the scale of Government
471 expenditure on Administration rather large relative to total revenue?; but we must content ourselves with one last reflection. The paucity of material resources in the Islands is such that capital investment for raising production can only be applied to agriculture and to improving the productivity of labour in those industrial or commercial services called into being by the locational

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Table 33. Internal revenue account 1953-54.

A. Ordinary Expenditure.		
(i) Maltese Government Administration £1.667 millions Public Debt and Pensions .291 "		£1.958 millions
(ii) Medical, Health, Commodity Subsidies and other Social Expenditure	2.625	"
(iii) Public Works and Agriculture	.559	"
	£5.142	"
(iv) LESS Revenue Profit on self balancing services	0.441	"
Net Ordinary Expenditure	£4.701	"
B. Special Expenditure.		
(i) Emigration	£0.143 millions	
(ii) Colonial Development Works and Services	0.460	"
(iii) Imperial Government Expenditure - Administration, etc.	0.292	"
(iv) Works Extraordinary	0.268	"
Total Special Expenditure	£1.163	"
Grand Total Expenditure	£5.864	"
C. Revenue Directly Derived From Outside Malta.		
(i) Imperial Government Grants for Special Expenditure	£0.814 millions	
(ii) Estimated External Revenue from:- Customs and Excise £1 million Lotteries £0.180 millions	£1.180 millions	
	£1.994	"
D. Revenue Directly Derived From Inside Malta.		
(i) Customs and Excise (see C (ii))	£2.217 millions	
(ii) Income Tax, Succession and Donation Duties	0.662	"
(iii) Lotteries (estimated £400,000), Note Fund, Savings Bank, etc.	1.491	"
	£4.370	"
Grand Total Revenue	£6.364	"

value of the Islands. In the sector of welfare economics the field for investment is in a sense limitless including as it does all the elements of water-supply, public health, education and dietetics. In this sector, capital can only come either from a relatively benevolent foreign power - and here lies the case for continued Maltese existence as a dependency and also the case for 'integration' with the United Kingdom - or hypothetically come from a vastly increased economic turnover within Malta. This immediately leads one back to the field of production economics. If, fundamentally, the value of the Islands for the attraction of capital lies in their location, then any decline in such attractiveness (as recently evinced

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434 by British actions) *ipso facto* suggests a decline in that value. Until recently,
471 as suggested elsewhere, domination by a new metropolitan power has implied domination by a more enterprising and a wealthier power. The inevitability of this process has become held so strongly almost as an article of faith by some Maltese that to suggest that it may now come to an end may be regarded as heretical. There is, in fact, every reason to suppose that Malta's locational value has now become so marginally attractive as to render even more economically dubious foreign investment in the limited and difficult sectors available for its application. Without such foreign capital in large quantities, revenue will neither be available for investment in production and welfare nor for continuing existence. The internal as well as external economic demands of the situation are therefore for the seizing of all opportunities to attract investment rather than for historically impossible attempts to preserve an economic *status quo*. Further, it is obviously essential that agriculture as the only sector in which capital and labour can be deployed on domestically controlled natural resources, must be transformed from hitherto the most neglected into one of the most important and potentially fruitful elements in the Islands' life.

Finally, in this general section, a consideration of the National Product serves to put the economic situation into perspective. The salient facts are these:-

433 Table 33. National product 1954.

434 A. Wages and Salaries.	
(i) Service Departments	£6.7 millions
(ii) Administration	3.5 "
(iii) Other	5.8 "
	£16.0 "
B. Incomes.	
(i) Farmers and Fishermen	£1.3 millions
(ii) Government Property	1.2 "
(iii) Private Receipts of Interest and Rents	2.8 "
	£5.3 "
C. Profits of Industrial and Commercial Enterprises	£6.0 millions
D. Net Indirect Taxation	£3.6 millions
Grand Total	£30.9 millions

Balogh and Sears in their interim report on economic conditions (14) computed that the total value of goods and services bought in 1954 amounted to over £51,400,000. Of this some £20,500,000 represented imports, leaving the total given in Table 33. More recent material, e.g. the 1955 Census of Production (15) which became available in 1958, would suggest the need for slight emendation of some items, particularly item C in Table 33. Further upward amendment to item B (i) is needed to cover that considerable part of agricultural production which, as field observation shows, never appears in mensurable channels. Balogh's conclusion however remains absolutely valid (16): 'In the last resort nearly all the income and employment on the Island(s) are derived from the U.K. Government'. He does however go on to say that (17): 'This unbalanced

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economic structure due to a British policy which in the past was almost entirely based on her own military needs constitutes an unanswerable case for adequate help to the Islands in their present effort' find alternative sources of employment'. From the factual point of view this last statement needs qualification, while in so far as it is representative in a mild way of an attitude which more violently would throw the whole onus of guaranteeing the future on to Britain it is dangerous. In the first place, as the various studies in this book indicate, Maltese economic dependence on the value placed on the islands by non-Maltese communities, necessarily in the light of their own needs, is of great antiquity. The only way in which Britain could have refrained from increasing this dependence would have been by positively encouraging social and economic stagnation outside a small Garrison pale. This leads to the second point that the indigenous population rapidly seized opportunities to rise above the low level of life possible on local non-locational resources. The development of the present economy is as much due to natural indigenous economic desires as to outside pressure. Thirdly, as noted in the Introduction, recent confusion of attitudes towards political subordination and social welfare as well as to production, has produced a general realisation of the problem, without producing any clear solutions. Indeed the implications of the suggested solutions have been met with natural but rather irrational repugnance. Finally, we may observe that the use of phrases such as 'alternative sources of employment' when what is really meant is 'alternative sources of wealth', must always darken counsel. Once again the need for realistic appraisal of natural resources becomes manifest.

The most up-to-date picture of the Islands' general economy may be derived from the 1958 Departmental reports published late in 1959 and 1960. In December 1958 the total population numbered almost 324,000, that of Malta having increased by 5 per cent. since 1948 in spite of emigration while that of Gozo declined by 0.4 per cent. as a result of emigration. The internal shifts of population that occurred during and after World War II have virtually ceased. The gainfully occupied population totalled 88,710, and less than 5 per cent. of the total male population aged 14-64 were not productively occupied. 25.4 per cent. of male workers were Government employees and paid out of Government revenue. 33.5 per cent. of the employed population worked in or for the Service Departments, deriving their income directly or indirectly from the Imperial Government. Thus, only 42 per cent. of the working population is employed in normal civilian activity and, as already noted, most of this activity is generated by indirect Imperial expenditure. In 1958 the gross national product had increased to £42.4 millions but the visible trade deficit also rose to £25.2 millions.

To conclude this section we turn by way of illustration from the general to the particular, to a brief consideration of two of the facets of Maltese life investigated by our team of research workers.

Her Majesty's Dockyard in Malta, for so long the crux of British interest in the Islands, has recently been transferred to civilian interests amidst a welter of differing reactions. Thanks to the co-operation of the Admiral Superintendent and his staff in March 1957 we have been able to analyse the main characteristics of the Dockyard, and present here a few of the relevant findings. At that time, 12,572 Maltese workers were directly employed in the Dockyard, almost exactly the same number as the total of farmholders, or the total engaged in 'industrial' occupations, i.e. mining, quarrying, manufacturing and construction. In the Dockyard there were four departments, those of the Captain, Construction, Engineering, and Electrical Engineering, which were regarded as 'professional departments'. These employed 59 per cent. of the total Dockyard employees, most of this proportion in skilled trades. In the remaining 11 departments, a considerable number of technicians and craftsmen were also employed as well as upper-grade administrative and financial personnel. The Dockyard thus contained the largest pool of skilled labour in the Islands and provided the most important training ground, because, of the roughly equal numbers in civil 'industrial' employment, a very much larger proportion was unskilled, particularly in the building industry (18).

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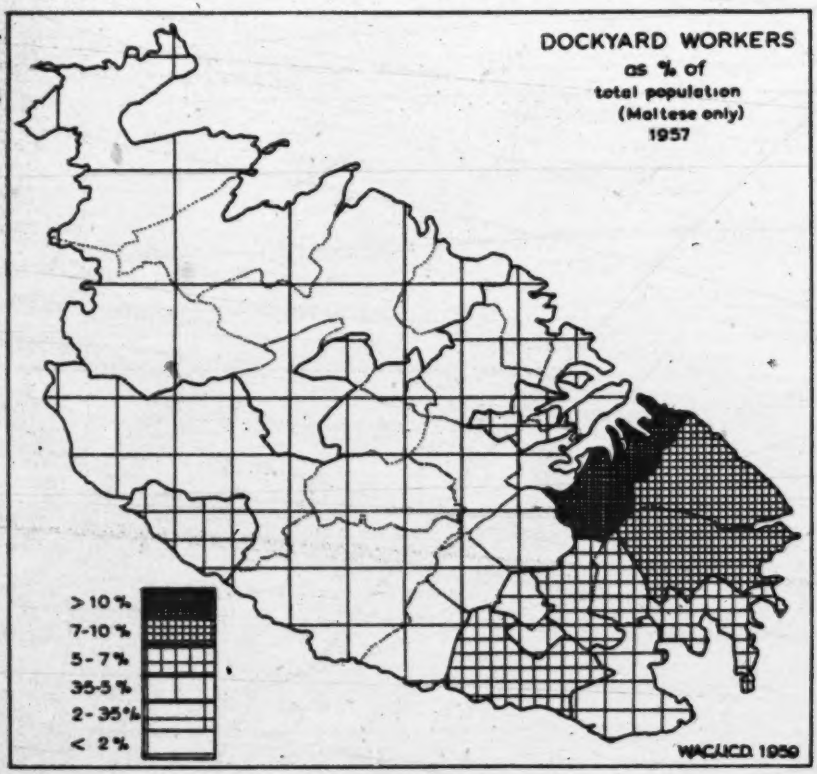

Fig. 64 Dockyard Workers as % age of Total Population.

[p. 172-A]

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102 Fig. 64 shows the distribution in Malta of Maltese Dockyard workers by
464 residence as a proportion of the total regional populations. The zones of con-
504 centration are centred on the Three Cities, and the great importance of Dock-
yard employment in the North-East as a whole, a phenomenon more than a
[361] century old (19), is clear. Particularly noteworthy in this context is the much smaller association of Dockyard employment with the belt of urban settlement which stretches from Valletta westwards to Lija. Conversely, the northern third of the Island, most recently settled and still relatively sparsely populated, has very little indeed to do with Grand Harbour. Gozo, still more remote, had but 25 Dockyard workers. Some 417 English workers were employed in the Dockyard most of them living in the suburban residential areas west of Valletta, 75 per cent. in contiguous Sliema, St. Julians and Gżira.

Thus we see the one part of the climax of that change in Malta which, commencing in the sixteenth century, swung the economic centre of gravity from the Centre to the North-East. During the last century the new conurbation
[894] extended its grip on the rest of the Island. Police Traffic Records (20) show part of this effect; on the 5th February, 1958, a normal day, 28 special buses, in addition to public transport, carried 930 Dockyard employees to work from a zone extending to Birżebbuġa, Żurrieq, Siġġiewi, Dingli, Rabat, Mosta and north-eastwards to St. Julians.

185 Here we have reason and space only for the briefest of notes on current
504 economic conditions. For more complete statements the reader is referred to the recent publications of the Maltese Department of Trade and Industry. As a result of Britain's reappraisal of her strategic needs, the old Naval Dockyard was handed over to a civilian firm by April 1959. Some emotional reaction has

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rather obscured the simultaneous mounting of a five-year Economic Development Plan. This is aimed at the establishment of manufacturing industries and envisages the expenditure of over £32,000,000, the bulk of which is to be contributed by the United Kingdom. Internal Legislation under the Aids to Industries Ordinance XXI of 1959 offers attractive terms to immigrant and local enterprises. At Marsa, an Industrial Estate is rapidly being built, public utilities are being extended and facilities for technical and craft training improved. Completion is expected in 1961 of the first commercial deep-water quays, complete with storage and handling facilities. Several British business interests have already responded to these new attractions.

However, the fundamental characteristics of the Maltese economy and society remain, and the whole complex of resources, appraisal of resources and social needs and demands must be appreciated before effective forces of change will appear.

As a last short study we turn to the development of communications and public transport in the Maltese Islands, which is of significance for two main reasons. First, in the pattern that has appeared we can see the interplay of all those forces, Imperial and indigenous, which have affected Maltese life. Secondly, although the Islands are small, distance and remoteness are everywhere measured mentally as well as physically, and the impact of modern transport has revolutionised Maltese life. The road pattern in Malta is complex and generally ancient (Fig. 68). It is impossible to categorise past and present roads sufficiently precisely to show cartographically the changes that have taken place and description must necessarily be brief. As shown in Worsley's survey of 1824 (21), the main alignments were then concentrated in the central region. Away from the grid-plan streets of Valletta and the less geometrical Three Cities (22), cart and carriage roads ran out to the main casals (within the zone referred to above as now served by Dockyard special buses) and inter-connected most of the rural centres. That part of the Island north of the Victoria Lines was poorly served. In Gozo, country tracks connected the villages with the inland capital of Rabat which in turn had a carriage road to the port of Migarr.

By 1911 (23) traffic had increased considerably, particularly within a four-mile radius of Valletta, and the Royal Commissioners of that year ventured to question on financial grounds the need for maintaining the very large mileage of the dense central and eastern network of roads, most of which as the result of long customary use and evolution were of equal status although often strictly unnecessary. The northern and southern coastlands were still served only by a few 'feeder lines' from interior settlements, but with the bridging of the Isperanza gorge at Mosta, that town had become a route focus for the whole of the northern territory and henceforward began to rival Rabat. Military needs had resulted in improvements being made to some roads but, more important still, had called into being in 1881 a railway running from Valletta to Rabat, and later extended expensively to the camp and hospital at Mtarfa. By 1911 the operating loss had become so great as to warrant special inquiry by the Commission. The failure was due partly to the fact that the system had not been designed on commercial lines, partly because the total demand for transport was still relatively small in the areas served, but mainly because a railway service could not be flexible enough to meet the particular demand that did exist. In 1905 a tramway system, less open to objection on all these grounds, was opened. First the area between Valletta, Marsa and Hamrun was served, and later lines were built to Zebbug. Designed for passenger rather than freight carrying, the tramways assisted in the extension of urban influence into the country. Then as now, however, that indented coastal configuration to which Malta owes her natural harbours, and around which resides the majority of the island's population, made land communication in the conurbation area tortuous and lengthy. Innumerable ferries and the *dghajjes* boats in Marsamxett and Grand Harbour offered more convenient carriage.

During and after World War I, motor vehicles made their appearance and the railroad and tramways rapidly disappeared leaving as sole traces of their

[See P. 184- Anb-Analyst]

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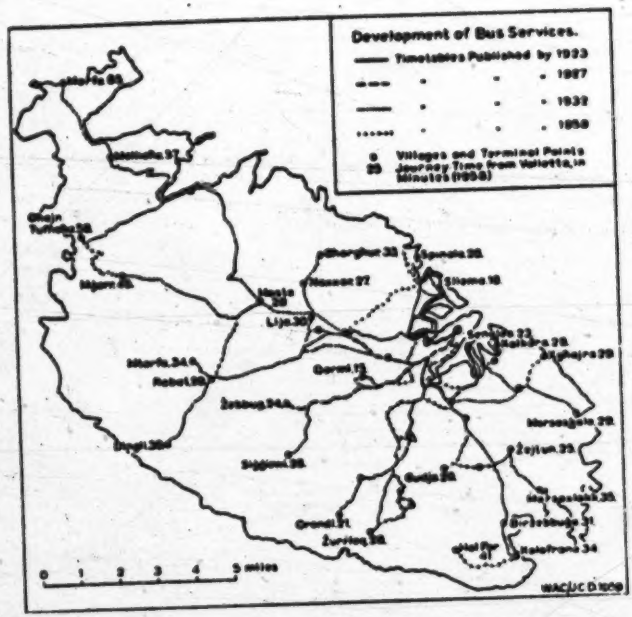

Fig. 65 Development of Bus Services.

494 existence field alignments, small bridges and 'permanent ways' soon absorbed into the weave of country lanes. With the coming of the car, lorry and bus there rapidly appeared differentials in the importance of the many roads. During the last 40 years, new motor roads have been built, such as that traversing Wied-tal-Pwales for military purposes, or the coast road between Salinas and St. Andrews for military and civil use, and recent alignment changes have been made to make more suitable for modern economic needs some old routes. In Gozo as in Malta this has led to the strengthening of importance of the capitals, and in the latter island to the appearance of true communication centres such as Mosta. At the same time the relative remoteness of those regions off the main highways has been increased.

The duality of the nature of these changes is well exemplified by the development of the public bus services (Fig. 65). In March 1959 there were 20,181 licensed vehicles of which over 13,000 were private cars and taxis, almost 4,000 lorries and vans and some 600 buses. These last play an essential part in Maltese life. In September 1922 (24), the first official recognition of the existence of buses plying for hire took the form of regulating tariffs by mileage. By September 1923 the boom in this new transport sector was such that further regulations had to be introduced. Operating permits were obligatory, certain minimum services required, and the order of departure of the competing buses regulated. At this time the recognised services only extended between Valletta and Sliema, making four stops in all, with a legal maximum of 50 buses a day. Later in 1923 this was extended to St. Julians, and until 1927 there is no mention of service extension outside this suburban zone, although by the latter date the number of buses per day had risen to over 130. In 1927, the first great extension

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occurred, linking Zebbug, Birkirkara and Kospikwa with Valletta. Even so, and as detailed regulations make it clear, the bus services were still designed for commuters. Significantly enough, each route extension was largely pioneered by newcomers to the business, and to this day, public road transport remains a matter of so regulating traffic that many small independent units can just pay their way. There seems to be no inclination either to develop or to encourage the formation of larger economic units.

In 1930, timetables were published first for services between Valletta and Mellieha via Mosta and St. Paul's Bay, and later between Kospikwa and Marsaskala. A separate Valletta-Mosta service also began operations. During the two following years, timetable recognition was given to other services which it seems were already operating and by the end of 1932 most of the services now in existence were then operating. Although the issue of timetables does not necessarily accurately date the commencement of services it does denote their firm establishment and as such is of considerable significance. As can be seen from Fig. 65, all routes lead to Valletta (see too p. 185) and Old Malta of the casals has become dominated by the conurbation. Not only are there few services inter-connecting the townships and villages but large areas in the West and North have either no bus service or have very limited services as, for example, Mgarr. The radial nature of the services is an obvious commentary on economy and society in Malta today; more than this it further exaggerates differences in accessibility as between regions and villages. It is no accident that Mgarr is the most agricultural of all settlements.

We can leave this brief selective examination of economic aspects of Maltese life with this last picture of the mechanically varied fleet of buses in their 15 vividly coloured regional liveries. As they pound noisily about the Island, they epitomise the uneasy mobility, the jerky breaking down of old parochialisms that is modern Malta.

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C. Constitutional and Social

During World War I the political situation in the Islands remained amazingly stable. The re-imposition of bureaucratic rule by the Governor removed at least some of the opportunities for dispute. The departure from the political scene of Mizzi and Strickland also removed some of the personal animus that had appeared in the political conflict. During the war, the Maltese manpower contribution in labour battalions and on ship was considerable, and the security of the naval base was never questioned. After the cessation of hostilities there followed economic dislocation and in 1918 15,000 Dockyard workers were discharged, only 5,000 of whom had been re-engaged by 1920. Partly as an ameliorative measure accompanying others more directly valuable, and partly as a liberalist appreciation of services rendered, a new constitution was established in 1921 and further liberalised in 1928.

The 1921 constitution provided for bicameral representative and responsible government. The Governor in Council retained limited but reserve powers although no very clear separation was made between domestic and imperial affairs. For some years relative stability was maintained and political parties, major and minor, began to crystallise. Unfortunately for Malta the issues that had already developed (see Chapter V B) survived and, with the resurgence of nationalism in Italy and the logical extension of the process of anglicisation, all the old suspicions and enmities reappeared. The party which was to become termed 'Nationalist' became the protagonist of the still dominant upper middle-class and professional group and of those who saw the position of the Church threatened by the waning of Italian cultural supremacy. In 1920 a permanent Board of Education was created and in 1924 the Compulsory Attendance Act ensured a certain minimum of attendance once a pupil was registered. Although the Church schools remained independent, the growing dominance of English and to a lesser extent Maltese, and of secular education finally sparked off that antagonism to change which existed. In 1927 Lord Strickland returned to lead a party committed to hasten such change. Once again conflict of interests became acute and after a temporary suspension of the constitution in 1930, it was finally revoked, legally in 1936, in fact with effect from 1933 when Italian finally lost its position as one of the official languages (1). To an outsider, now as then, the period appears tragic in that it is characterised by pre-occupation with affairs of little relevance to the needs of most Maltese. The social and cultural dichotomy within the Islands was maintained.

An attempt to restart constitutional development was made in 1939 by the creation of a representative council but World War II forced a return to centralised government particularly during the state of siege. After hostilities had ceased a fresh approach to the problem was made, much in the spirit of 1920, and in 1947 the Constitution which was in force until 1958 was promulgated. It provided for single chamber Legislative Assembly of 40 members. Party government through an Executive Council advised the Governor. He, as head of the Imperial Government, alone had executive and legislative power in those reserved 'matters touching the public safety or defence', advised by a Nominated Council. In practice, this 'dyarchical' system depended on a logically impossible understanding and appreciation of the division of interests between reserved and non-reserved, imperial and domestic, affairs. Nevertheless, and as realised by the subscribers to the Report on the Round Table Conference in 1955 (2), some reservation of power to the Imperial Government is inevitably necessary.

Since 1947, the cumulative effects of economic change have transformed the local political scene. There are now over 150,000 enfranchised voters and political power has slipped out of the hands of the upper middle-class. The most succinct statement of the platforms of the various modern political parties as they were before 1958 and probably still are in essence may be found in the Round Table Conference Report (3). To us, the most important feature of the contemporary political scene is the way in which the modern political cleavage

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is uneasily superimposed on the traditional pattern. The part played by the Church during the 1956 Referendum on integration with the United Kingdom was most complicated. During the disturbances following the breakdown of Government in the spring of 1958, town and country, proletariat and bourgeoisie, Maltese Malta and Latinised Malta, all reacted differently. Over all responsible actions looms the knowledge that Malta is not a viable independency (4).

As we have seen, education and language have been inextricably involved in politics (5). More directly important is the educational effect on the people as a whole of the system of public instruction. Under the leadership of Dr. Albert Laferla public education became vastly improved in all ways (6), and from his tutelage, more particularly after the Compulsory Attendance Act of 1924, came the generation of Maltese which now forms economically and socially the most important part of the population. After 1933, Italian ceased to be used as a medium of instruction, a standard Maltese orthography came into use (7), and the school system was expanded to meet the most obvious and immediate needs. Education was sadly disrupted by World War II but since that time has continued to improve in quality and range of facilities (8). Compulsory Education as distinct from compulsory attendance came into force in 1946, and in 1955 full-time education became the rule. Some 22 per cent. of children of school age still receive education in private, usually Church run, schools.

It is vital to realise the extent of the social and economic revolution implied in these developments. In the rural areas the change has been one from illiteracy to education within one generation. Even in the towns, and this is particularly true for the new growths associated with dockyard, manufacturing and service industry employment, thoughts and activities are being fundamentally affected by education for the first time in Maltese history. Contrasts between the levels of awareness of the value of formal education are considerable, and the full impact of technical education has yet to be felt - the first Government Technical School was opened in 1934. The chief contrast observable in the field however is between the two age groups, over and under 30 to 35 years of age. The former still contains many illiterate and therefore conservative people; the latter by reason of training as well as age is radical and impatient. The latter attitude is largely responsible for the drift from the land which encourages the domination of agriculture by residual conservatism.

In the field of public health, skeletal public works services had been constructed before World War I. Recent developments may be regarded as logical extensions both in the sector of public works and in the field of medicine. As late as 1936 the judgment of the Chief Government Medical Officer was 'no scheme of sanitary reform ever met with greater opposition than the establishment of the modern sewer system in Malta' (9), but by 1955, about 270,000 or over 90 per cent. of the Maltese population lived in sewered dwellings, Żurrieq alone among the large villages remaining unserved. In parts of the countryside and in the smaller villages, dispersion of settlement renders prohibitive the cost of connection of each dwelling with the public sewers. The more isolated and the more rural areas are now the regions of lowest standards (Fig. 33).

Medical services, particularly in their relevance to the problem of high infant mortality, developed late and slowly (10). The most serious obstacles were those rooted in Maltese social life (11). The strength of the matriarchal tradition in Maltese household has meant that the ignorance of the oldest generation persists in imposing itself on the life of the youngest. Dirt, overclothing and under-feeding, the indiscriminate and early use of farinaceous foods, all these were difficult to eradicate in overcrowded and grandmother-dominated conditions (12). The difficulty of educating in hygiene and personal health an indifferent and tradition-bound population proved insuperable and in 1939 the infantile mortality rate was as high as the average for the preceding 20 years.

The final breakthrough occurred paradoxically during World War II. In 1943 and 1944 housing conditions and diet were worse than any experienced in peacetime but the death rate and the infantile mortality rate began to fall to record

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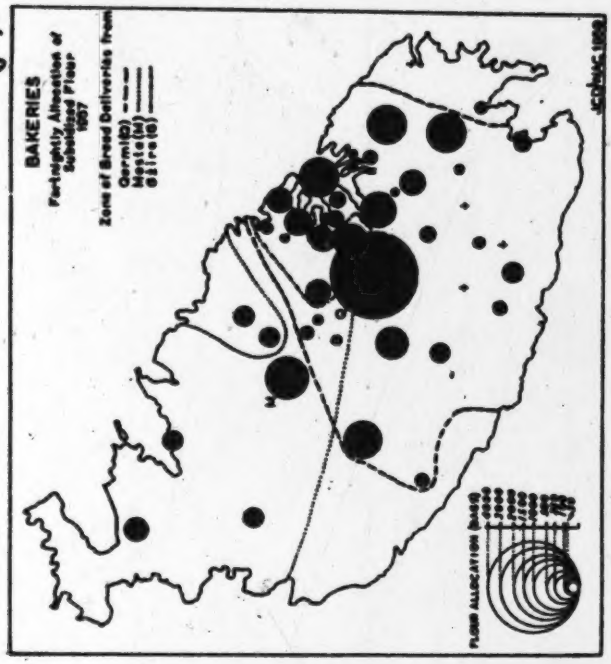

Fig. 67 Bakeries.

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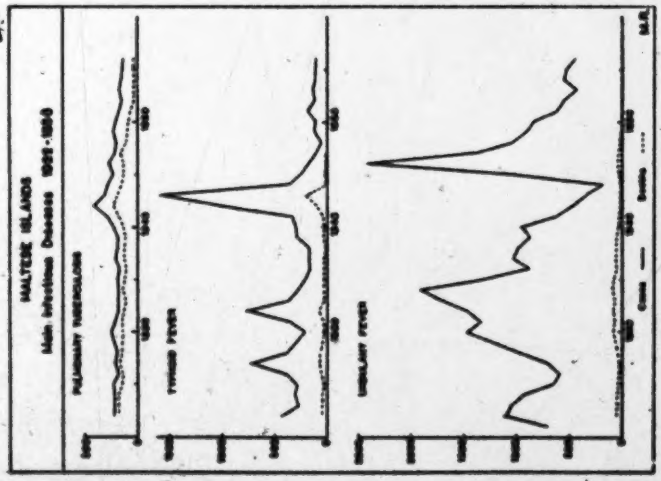

Fig. 68 Maltese Islands: Main Infectious Diseases.

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low levels. Earlier improvements probably supplied the basis for change but more important was the fact that, for the first time, the effective Garrison of Malta included the whole population. The new machinery for public information, the desperate need for reducing disease incidence and preventing epidemics, and even food rationing and shortage had cumulatively beneficial effects on the public mind. More than all, it would seem, the military control of the besieged islands with its conscription of many Maltese males and the increased contact of British troops with the people, together with that strange uniting exaltation in face of danger observed in other countries, all shocked Malta into new ways of thought (Fig. 66).

After the war this momentum was maintained during the period of reconstruction. The Malta Memorial District Nursing Association, Child Health Clinics, and U.N.-established ante-natal clinics have now been accepted and their services utilised. In 1959 the infantile mortality rate was 34.7 per 1,000, leaving the memory of the rate of 350 per 1,000 in 1942 far behind.

This revolutionary change is of particular revelance to this study. Many of its implications need no labouring. The demographic consequences, for instance, are obvious enough, as also the slowness with which traditional ways of life in Malta have changed. For us the most important consequence is that rising generations through a new awareness of causation and consequence, of scientific processes, are becoming vulnerable to new ideas in associated fields. There are no great steps between preventive human medicine, inoculation, livestock injections and an appreciation of plant pathology. One difficulty remains; the rural areas are the least affected by these recent changes and those individuals in the countryside who are mentally injected with new ideas and understanding are, for various reasons, the least likely to remain in agriculture.

Exemplifying this continuing regional dichotomy, but unity in complexity, is the recent history of milk consumption and production (13). Traditionally in Malta, 'the entire milk supply has been delivered by the goat herself' (14). Sometimes living with their flocks in the *fossa* which surround Valletta, the herdsmen would wander the streets, milking the animals on demand. Bruce and Zammit in 1885 and 1905 showed that the bacillus of Undulant or Malta Fever was freely excreted in goats milk and that the high incidence in Malta of this debilitating, sometimes lethal, disease was a natural consequence of the general albeit low per capita consumption of fresh milk from predominantly diseased goats. After considerable investigation, a milk pasteurising plant was erected and the first pasteurised milk was distributed, Valletta, Floriana and Sliema being declared 'closed areas' within which the sale of raw milk became illegal. During World War II, further extension of this policy was prevented but, since most goats were slaughtered for meat because of fodder shortage and because consumption of tinned milk became normal, the incidence of Malta fever fell to record low levels. Post-war revival in goats' milk production resulted in general re-infection by brucellosis and in 1946 the incidence of undulant fever was the highest ever recorded. During the post-war period public health and welfare policies have encouraged the consumption of milk. Because of the incidence of Malta fever, this has entailed the provision of expensive pasteurising plant, the prevention of the sale of unpasteurised, and the official encouragement of production of cows' rather than goats' milk.

This particular development is examined at greater length in Chapter X but some main points of general import merit consideration here. First, Maltese society has recently been affected by social, dietetic and medical policies which profoundly affect the basis of social life. In general one might say that the Maltese way of life is being made more remote from the simple crudities of parochial experience. Secondly, in the field of health and social welfare, the criterion of scientifically measured need has been adopted as the basis of official policy and the question of availability of resources is regarded as of secondary importance. Thirdly, this increasing social sophistication has only very recently become operative in Maltese life and different scales of value exist in different generations and in different social groups. Lastly, it would be fair to say that, while the urban markets are still only relatively fastidious

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about quality and as yet incompletely dominated by ideas of welfare economics, the rural community is far less affected by change. While milk consumers in the towns are often either not completely convinced of the need for milk processing or at the other extreme will use only imported tinned milk where possible, the producers are generally even less convinced of the need for care in the production of clean milk. Unpasteurised goats' milk is still generally used in those farming households where milk is consumed at all, and understanding of the processes of infection is but slowly growing. Thus, in the field of public health and personal hygiene and medical care, social changes have been rapid, recent and uneven in incidence. Here, as in the economic sector, the mental acceptance of new ideas is not yet complete and is least advanced in the most rural and remote regions.

The examination already made of the demographic situation in the Maltese Islands needs some brief consideration against the background of social attitudes. The consensus of expert opinion is that in developing societies a falling birth rate is the result not of an actual decline in fertility but of family limitation. In most regions such a decline in family size is associated with changed social attitudes, which have become accepted in many countries in which Roman Catholicism is the dominant religion. Pope Pius XII himself condemned irresponsible parenthood and said it is 'a mistake and a departure from moral truth to exalt too highly the generative function even in its right moral setting of married life' (15).

The insularity and historical experience of Malta have preserved there a more rigid and strict application of Catholic rules of conduct, in which, despite the inadequacy of the Islands' resources to provide for the economic welfare of the population, the virtues of the large family are still stressed. Archbishop Gonzi in 1958 reminded an audience of young people that, although large families entailed much sacrifice on the part of the parents, parents should be prepared for a life of sacrifice (16). Father Vella, the founder of the Cana movement has said: 'One of Malta's glories is her large families' (17).

In Malta therefore the weight of the Church tends to discourage the secular social trend towards smaller families, and still makes illegal any provision for family limitation. Where secularism is strongest, in the urban cosmopolis, family size declines most rapidly. In the rural communities, where the precepts of the Church are most conscientiously observed and where the effect of secular socio-economic desires is most restricted, large families are normal and admired.

This regional contrast in social behaviour, when superimposed upon purely demographic variations in rates of population growth, becomes sometimes emphasised and sometimes negated. In the northern third of Malta, inward internal movement as a consequence of 'pioneer' agricultural settlement during and after the mid-nineteenth century produced a 'young' population, high birth rates and rates of natural increase. This region has remained almost entirely rural in social character. The second main region of inward movement of population, the suburban area, has experienced a recent decline in the early high birth rates as a result of the impact of secular ideas.

The urban heart of Malta in Valletta and Floriana by contrast, has been both traditionally a zone of outward movement of population and the district most affected by changes in social attitudes to family propagation. The remaining area, the heart and core of Maltese 'casal' life, illustrates clearly the delicate balance between demographic and religious and secular social influences. From this central area have traditionally gone the migrants to the new towns and the 'new' northern farming areas. The efflux has counteracted the traditionally rural and strongly religious tendency towards large families and a high rate of natural increase. On the southern fringe of this zone however lies the Żurrieq group of 'casals' and villages. From this until recently relatively isolated district, emigration has never been high and, with a survival of traditional rural values, this region has had in the 1950's the consistently highest birth rates - over 30 per 1,000 - of the *Maltese* population.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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As has already appeared it is impossible to live and work in Malta without becoming very much aware of the strength of the Church. We venture therefore to make some necessary comment on this at once most delicate and yet most vigorous aspect of Maltese affairs. 175 79

As noted in Chapter IV, religious activity of a highly developed and institutionalised nature was a feature of Malta even in prehistory. Little direct evidence is available of this facet of life in the semitic or classical cultures, and even when we come to the Christian era and St. Paul's shipwreck 'on an island called Melita' we have no conclusive evidence that this in fact was Malta, or that St. Paul introduced Christianity to the Islands (18).

At all events the Christian Church entered the Islands in Roman times, and the line of bishops regarded as beginning with Publius, St. Paul's host, although broken during the period of Arab rule, was re-established by the Normans. As examined in Chapter IV, from this time onward Malta became first a simple fief in Christendom and then its bastion, held by a Religious Order. Whatever toleration there may once have been between Christian and Moslem before 1530 was quickly erased.

The report by the Apostolic Visitor, Mgr. Pietro Duzina (19) of his visit to Malta in 1575 throws some light on the condition of the Church at the time. In answer to unorthodoxy a Holy Tribunal of the Inquisition was established, creating three rival forces in the Islands, the Grand Master, the Inquisitor and the Bishop. From Duzina's report and subsequent accounts we see that not until the Turkish threat in 1565 had been repulsed and the Visitor's instructions for future conduct had had some effect, did village life become centred around new and magnificent churches which replaced the smaller more humble edifices in the hamlets. Curia and architectural evidence (20) corroborate each other. From this time onward, the parishes, growing in number, became the administrative and social regional units that counted in Maltese life and the Parish Church became the focus of the religious, social, and economic life of the casals and villages. As patrons of all the arts, repositories of wealth, directors not only of consciences but all conscious action, the Parish organisations became, and to an amazing extent still retain, a permeating power. Quite apart from the regular clergy the Religious Orders have played an important part in the Maltese Church and in education and other aspects of social activity. The relationship between the Church and the Order of St. John was not always completely amicable. In the traditional village scene the village priest, in the virtual absence of an indigenous squirearchy, was the teacher, doctor, legal advisor as well as spiritual mentor. Compared with this the Knights were alien and apart from Maltese life. The position of the Church and the Order vis-a-vis the Papacy was also not completely easy. Nevertheless, mainly as a result of mutual non-interference, the Church gained complete local ascendancy.

During the nineteenth century an uneasy *modus vivendi* was established between the Church and the new non-Catholic rulers, and during most of the conflict over language and culture the Church played a pacific and calming role, concerning itself mainly with the administrative details necessitated by the rapidly increasing and nucleating population. How far the dependence of the individual on the spirit and dogma of his belief, the faith described in 1840 by Mège (21) as *'cette piété poussé jusqu'au fanatisme'*, has been supported by the long years of insecurity during which Divine and ecclesiastical protection was felt as a real and precious thing, it is hard to say. One may speculate on the fact that it was at the old 'frontier' casal at Mosta, westernmost of the old settlements, that local piety built in days of security the vast church with a dome that ranks among the largest of the world. It is also true that the Maltese Church enforces more strict rules of conduct upon its people than other Churches now find possible.

However we may interpret the situation, the Church which succeeded in adjusting itself to nineteenth century changes has been faced in the twentieth with the consequences of those changes. The traditional society in which it was virtually omnipotent and omnipresent is changing into a new society in which the individual does not have to lean so much on the priest. Now, the younger genera- 178 79

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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178 tion can read, travel and make contact directly and vicariously with the world
79 outside. Emigration too has tested the strength of the Faith. In consequence, we can now find in Malta a historical cross-section represented in spatial distribution. At one extreme one can meet in Sliema agnostic Maltese who never go near a church; at the other, in rural Gozo, one can find general obedience to the Bishop's instructions. All societies are heterogeneous in this respect but in Malta the strain of division within society is particularly great because of the existence of so many other cleavages. The reaction of the Church to this new situation has been dual in character. In the first place the Church itself has taken official action. Reform and correction, the imposition of rigorous film and book censorship, the series of edicts on dress and on behaviour have accompanied research, such as that of Abbé Houtart (22), into the needs of the people. Secondly, there have appeared the lay organisations with the avowed intent of redressing the balance. M.U.S.E.U.M. and Catholic Action before World War II, Cana, Legion of Mary, Social Action, the Holy Name Society and many others of foreign and indigenous origin since 1945 have developed in the conurbation where the challenge to the Church was strongest (23).

Financially the Church is still strong, owning as it does some 19 per cent. of the agricultural land of the Islands and an unverifiable total of urban property (24). Politically, the strength of the Church rests on its hold over the minds and hearts of the people. It is not necessary for the Church to take much overt action to demonstrate its power.

178 As a last vignette of the changing Maltese socio-economic complex we may
256 consider some aspects of recent research on a useful indicator of social change,
655 the bread baking industry (25).
722 The purchasing, distribution and processing of wheat and wheat flour, remains as it has been for centuries, Government controlled. When the Knights established their capital at Valletta and when the suburb-outwork of Floriana was built, great stone-chamber granaries were hewn out of the solid rock, developed versions of the much older 'bell-pits'. These underground granaries were stocked by the official organisation, the *Universita*, and the grain periodically distributed at controlled prices. This siege-system, necessitated by dependence on imports, was abolished in the early nineteenth century, and the newly established Board of Trade contented itself with licensing importations. As a measure of agricultural protection and for the raising of revenue, duties were levied on these shipments. During the twentieth century, and culminating in the emergency measures of the beleaguered Islands during World War II, controls became tighter and grain prices heavily subsidised.

178 During the period of urbanisation and more especially during the last siege
256 the general practice of home baking rapidly declined in Malta, although in Gozo it still persists. In the latter island there was in 1957 only one full-time and one part-time commercial bakery, while in Malta there were 201. All food grains produced for sale in the Island should legally be sent to licensed flour mills for blending. Imports, almost entirely of hard Canadian grain, are made by the Department of Trade and by the Victualling Yard in H.M. Dockyard. Ninety-seven per cent. of all flour issued for ration-bread making is subsidised, but local estimates suggest that up to 50 per cent. is used for making other products, this illegally used flour being sold at a discount.

109 Fig. 67 shows the distribution of bakeries in Malta, their importance and
178 the main distribution areas as they existed in 1957. Only two villages in 1950
256 and one in 1957 - Safi - did not possess their own bakeries. This however is not indicative of closed fields of distribution but only of the multiplicity and the small-scale of the enterprises. Of the 35 districts, 32 imported bread from and 17 exported bread to other areas. Over half the 15,000 bags of subsidised flour issued in 1950 eventually found their way as bread outside the receiving districts. Of this inter-regional trade, Qormi supplied almost 80 per cent. Very briefly the points of interest are as follows. Qormi, which in 1957 had 48 bakeries, has always been the traditional baking centre, partly because of its central situation, but mainly as noted in Chapter VIII because of its situation in

[See p. 198 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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a dry-farming cereal region. The other main centres are of more recent growth and reflect a variety of factors, Mosta as a regional centre, Gżira and Msida as suitably placed coastal sites within the conurbation. Secondly, the distribution of bakeries does not correspond directly with variations in population density but rather reflects those variations in an exaggerated form. If we omit Qormi from consideration, Fig. 67 indicates fairly accurately the strength or weakness of traditional society in inverse ratio to the strength of commercial bakery development. Thirdly, the inter-regional 'trade' in bread, together with evidence we have no space to consider such as the development of travelling shops, etc., shows the importance of the new mobility which is rapidly breaking down old parochialisms. Uniformity, homogeneity, openness to world ideas, these are the social virtues lauded in the twentieth century, which are being inculcated in Malta most effectively by the delivery vans of the new commercialism. The decline of local individualisms is aesthetically sad; it is also dangerous in that the smoother the appearance of the social emulsion the less heed is paid to the degree of real cohesion between its members.

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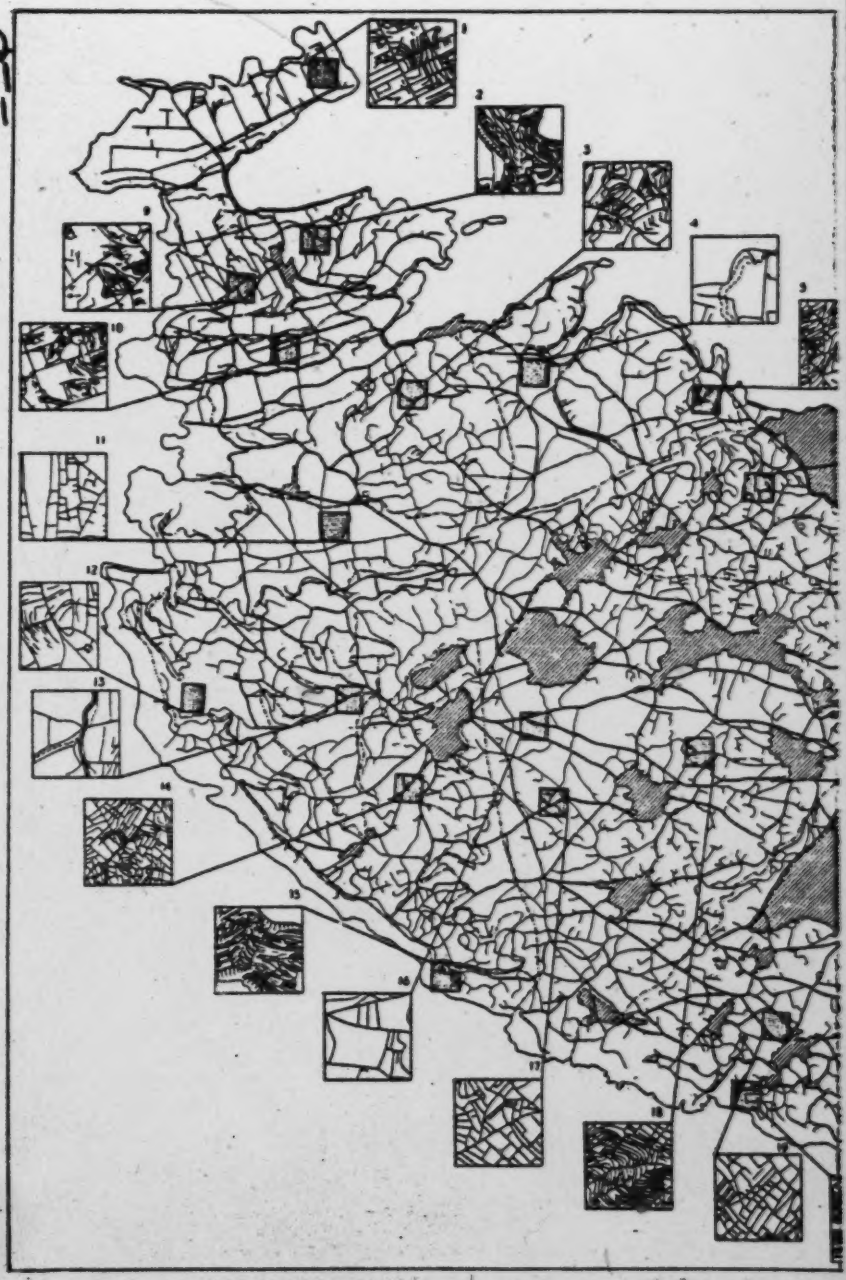

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Fig. 68 Communications and Field Patterns

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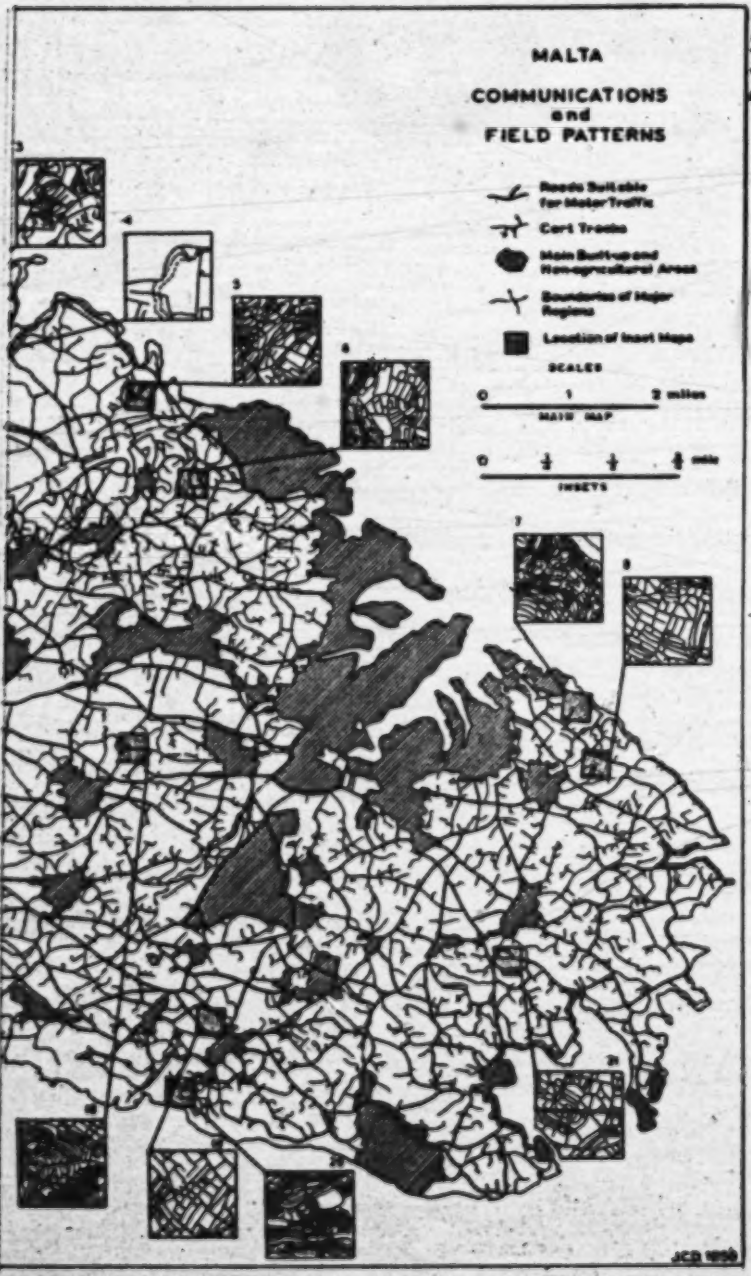

Communications and Field Patterns.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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D. Note on Fig. 68

COMMUNICATIONS AND FIELD PATTERNS

Roads, tracks, stone walls and buildings are the human imprint on the surface of the land and the first three of these elements are illustrated in Fig. 68. The pattern of communications, while at first appearing quite devoid of plan, nevertheless shows distinct regional characteristics. On the Coralline Uplands, where cultivated land is often scattered among stretches of karst, there are few motorable roads, but numerous tracks appear to wander at will across the surface. In the Marfa, Mellieha Ridge and Bajda Ridge districts, a grid-iron pattern of roads and tracks reflects mid-nineteenth century plans for the allocation of land.

Basins and lowlands such as Mitieb, Bingemma, Wied tal-Pwales, the Blue Clay Basin and Wied il-Ghasel, are characterised by an open network which includes several important roads and a minimum of linking tracks, an arrangement also characteristic of the central plains west of Żebbuġ and Siġġiewi. In these areas, the gentle slopes obviate the necessity for cart access to every field, while the absence of terraces does away with the need for well-defined, walled tracks. 'Service tracks' leading off the main lines, are virtually absent. This is in complete contrast with the state of affairs prevailing throughout the bulk of central, southern and eastern Malta, where roads and connecting tracks form a denser web between the numerous settlements and their lands. Here, 'cul-de-sac' service tracks abound and few fields are more than a quarter of a mile from one of them. There is a marked tendency for the network to become closer in regions where steep slopes are common as in the Naxxar-Gharghur hills and around the Wied il-Kbir complex.

The inset maps, each covering an area of one-ninth square mile, illustrate the great variety of field size, shape and arrangement to be found in Malta.

1. Marfa. The rectilinear nineteenth-century pattern has been superimposed on older patterns which show a clear relationship to topography.
2. Mellieha Upland - Wied Ghajn Żejtuna. The narrow terraces of the sharply sloping valley sides contrast with the rather larger fields of the valley floor and with the open karst of the upland.
3. Wardija Uplands. An irregular pattern developed on the Coralline plateau summit.
4. Wied il-Ghasel. Unusually large, open fields with only occasional walls. The wied channel (shown by broken lines) has been ploughed over.
5. Ghallis Hills. Small, irregular enclosures on the hill tops; larger, more regular fields in the small valley seen in the south-east.
6. Naxxar-Gharghur Hills. Large fields on the smooth hill summits; extremely narrow terraces on the sharply incised valley sides.
7. Ricasoli-Zonkor Ridge. Minute enclosures, the smallest in Malta, on the seaward side of the ridge.
8. Larger more regular fields on the southerly, inland slopes of the same ridge.
9. Mellieha Ridge. Fragments of an old, topographically-determined pattern remain, on which a few lines of more recent origin have been superimposed.
10. Bajda Ridge. A clear example of the superimposition already referred to.
11. Bingemma Basin. Large fields, often with a strip formation, are typical of down-faulted Upper Coralline basins.
12. Santi-Bingemma Uplands. Now almost entirely abandoned: the fragmentary character of the pattern is typical of such areas.
13. Blue Clay Basin, near Fiddien Bridge. Large, open fields.
14. Rabat-Dingli Uplands. A more intensively worked section of the Upper Coralline along the Rabat-Dingli road (shown by a double line). Contrast with number 12.
15. Western Rdum Lands. Part of the Rdum tal-Lunajata showing the minute subdivision typical of such areas.
16, 17, 18, illustrate variations within the central part of Malta. In example 16, the fields are particularly large. 17 shows greater subdivision, irregular in the north and approaching the rectilinear in the south. 18 illustrates the effects of steeper slopes, in this case on the southern side of the Wied is-Sewda.
19. A regular pattern on gentle slopes between Qrendi and Mqabba.
20. Minute terraces near the southern coast.
21. The effect of recent road building is illustrated here in the splitting up of no less than 14 fields, along a 600 yard stretch of road. In the process, a number of minute fields of little or no value have been formed.

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SECTION 3

AGRICULTURE

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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INTRODUCTION

Contemporary agriculture can only be understood in terms of the whole nexus of environmental and human factors. Although a general truism this assertion continually needs to be emphasised in a study of Malta. In these Islands the observer will meet more puzzling features both major and minor in scale than it is conceivable would be found in any territory of similar size. The wider one's comparative experience, the more it appears necessary to discard general principles and to adopt a habit of querying the origin of every minor element in the landscape. The various problems are examined elsewhere but a brief statement of their type and range will serve to depict the complex nature of Maltese agriculture.

All visitors to Malta are invariably impressed by the vast extent of stone terrace walls which give to the ground-level observer an impression of rocky barrenness. The questions which arise, and which have not been satisfactorily answered, are manifold in their complexity. Do the terrace-walls merely serve to retain naturally-evolved soil and if so is the present density of enclosures strictly necessary? Are these walls, on the other hand, ramparts behind which man-made soil accumulations have been slowly built up to create artificial fields? If the latter, does normal pedological analysis provide a sufficient basis for soil husbandry? If the former, how far can enclosures be enlarged to permit a greater use of mechanised techniques?

The climate of Malta, as analysed in Chapter II, has some especial characteristics. How far do certain combinations of temperature, humidity and wind velocity in various topographic circumstances encourage the appearance and survival of the very many diseases and pests which afflict Maltese crops? To what extent may the climate-soil complex be held responsible for the virtual absence of the olive and the remarkable ignorance concerning viticulture which is only now being dispelled? Must the physical environment be regarded as the main reason for the fact that Maltese farmers have never produced important indigenous strains of crops or livestock but have relied entirely on breeds imported from their more productive neighbours?

Innumerable queries of this type result from even the most cursory visual survey, and any attempt to answer them brings in even more complex human questions. If the maintenance of man-made soil in artificial fields by arduous manual labour is essential for the ecological stability of many regions, how important is the conflict between the needs of production and the social desires of the cultivators? How far has poor husbandry been a product of rural isolation? How measurable is distance as it affects contact between producer and market, between village-dweller and *il-Belt*? None of these and other questions is uniquely applicable to Malta, but *in toto* they present such a formidable array as to make one feel that these small islands have concentrated within them certain microcosmic qualities.

In this Section are considered some of the observable facts tha. directly concern the use and potentialities of agricultural resources. The main features of the economy and society in general have been described in previous sections; the basic elements of the agricultural sector may be summarised as follows.

The total area of the Maltese Islands is some 380,512 *tmien* of which 152,343 *tmien* are cultivated (54 per cent of the total) (1). The relationship between Malta and Gozo in these respects is remarkably constant, both islands having a similar proportion of worked land, Malta possessing 70 per cent. of the total area and of the cultivated land. Of the 7,272 *tmien* of irrigated land, almost 89 per cent. is found in Malta where the only large irrigated zones also occur.

This cultivated land is worked in 12,315 registered farmholdings of which over 70 per cent. are in Malta. The rural community (i.e. persons living in dwellings registered as farms and including farmworkers' children and other members of the family otherwise employed) number 57,354 (72 per cent. in Malta), almost 18 per cent. of the total population. Of this rural community 34

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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per cent. are children under 14 years of age. The number of whole-time farmers, 8,100, is now smaller than the group of part-time agriculturalists - 8,946, and in its age-composition differs significantly from the total population - 48 per cent. are aged 50 years or more (1948 - 33.8 per cent.) as compared with 31 per cent. for the Islands as a whole.

The relatively small and, until very recently, declining size of the full-time farming population, and its rapid ageing, suggest a decline in the importance and status of agriculture. The implications of these figures are discussed elsewhere but it is worth noting that the agricultural areas are still inhabited by over 126,000 persons most of whom draw some real income from the land in amounts which may often be small per capita but which observation suggests are large in total.

The total value of the recorded crop product is estimated at some £2.27 millions. From observation in Malta and experience elsewhere one can suggest that is under-estimated by a fraction of the order of 10 per cent. (See p. 10, - Essential Statistics - for further information.)

The combined value of crop and livestock products is estimated at almost £6,000,000. The income accruing to the cultivators is distributed in such a multiplicity of ways in such varying amounts that no useful estimate of average per capita income can be made. Of the disbursements of some £3 millions, an amount of the order of £2½ millions is expended on imports, notably of fodder and store cattle. Earnings of foreign currency amount to approximately £500,000, almost half of which derived from potato exports. This imbalance between imports and exports in the agricultural sector appears even more striking when one remembers that F.D.T. imports of over £9,000,000 make up 38 per cent. of the total Maltese import bill.

The efforts of the 9 per cent. of the employed population engaged in agriculture are already considerable but the needs of Malta are great. With no known physical resources of any size other than the land, it becomes of vital importance that farming productivity should be raised even further and that special effort is directed towards a legitimate degree of self-sufficiency in agricultural products. Much of the analysis that follows this introduction must be considered in the light of present and future needs.

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Plate XV. Worked-out quarry in the Naxxar-Gharghur Hills. Spring. Vines cultivated at various levels.

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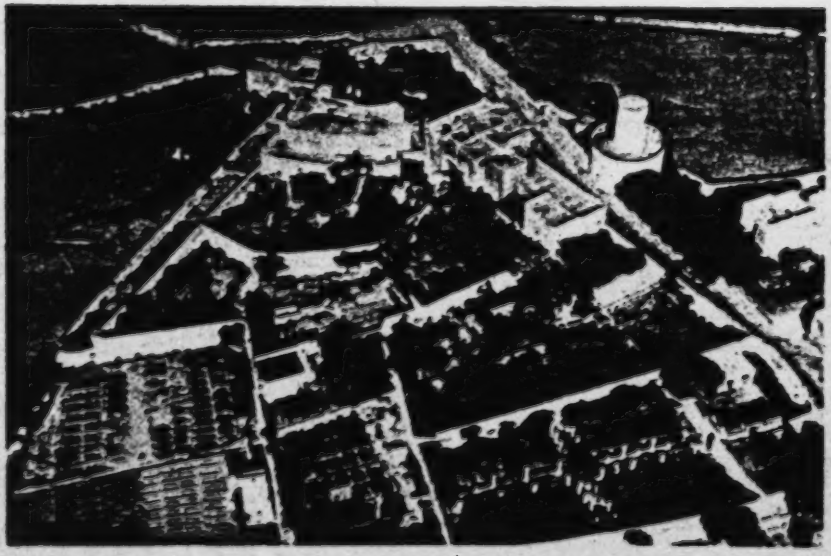

Plate XVI. Walled orchards and gardens south of Naxxar. Summer. The circular building in the middle distance is an old windmill.

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[P. 191]

Chapter VII

A. The Land Use Survey of the Maltese Islands

When, in 1954, the decision was made to undertake a programme of geographical research into Maltese agricultural resources and their utilisation, it was also decided to base such a programme on fundamental observational work. The availability of excellent maps on scales of 25 inches, 6 inches and 2 inches to the mile, made it possible to envisage a complete and detailed survey of land use, field by field, plot by plot. Financial exigencies and the need for concentrating work into a short critical period, made it necessary so to plan the first visit as to make the findings representative of the whole range of conditions observable. The work was later extended to cover the full area of the Islands. 311* 121

From the outset, it was realised that work along the lines adopted elsewhere under the World Land Utilisation Survey scheme, while valuable as a first step in regions of considerable extent, would be inadequate under Maltese conditions. Several of the categories suggested by the scheme for use in the Old World (e.g. 6: Unimproved Grazing Land and 7: Woodland) do not exist in Malta while others (e.g. 3: Tree and other Perennial Crops and 4: Crop Land) are too broad to give any indication of regional land use characteristics. The small size of the Maltese Islands has made it possible, despite the minute sub-division of the land to carry out a field-by-field survey of use while at the same time distinguishing all the main crops. It is the combinations of these many different crops which most obviously mark out the different agricultural regions and which make necessary a breakdown of the broader land use categories. It has been appreciated that in many territories suitable conditions do not exist for this 'microscopic' approach, but the authors venture to wonder whether the dangers of more general surveys may not outweigh the value of their findings. These dangers lie not intrinsically in the scale of work but rather in that the findings, if used at all, will generally be used by people who may not appreciate their shortcomings. The problem lies in the gulf between the researcher and those responsible for policies and action.

The survey has been essentially a team effort, directed by the senior authors, the field work being carried out by them with the assistance of the student members of the survey parties (see Introduction, p. 9). It was found that a great deal of useful work could be carried out by the latter, provided that more experienced workers were available to organise and take part in the actual field work and to correlate and interpret the results. The basic method was the plotting of crops actually growing in the fields at the time of the survey (see below) on 6-inch or 25-inch maps. The latter scale was used in parts of Malta where fields are too small to allow the use of the 6-inch scale and throughout Gozo where 6-inch maps are not available. However, the work was not confined to mere crop-plotting, but included the noting of a variety of elements: the quality of the crops, conditions of soil, drainage and water supply, the relationship of crops to rock type, slope, exposure and other physical factors, farming techniques, irrigation methods and the character and extent of rural settlement. A large number of perspective sketches, plots of individual fields, and case studies of farms, a fraction of which are reproduced in the present volume, were made and many photographs taken. Wherever possible, farmers were interviewed and, although this was most easily done when interpreters were available, sufficient farmers with some English were found to extend the scope of this part of the work to cover some 250 individuals. Each day's work was followed by a conference at which points noted by the field workers were discussed and recorded. By these means, sufficient material of all kinds was gathered to permit not only the compilation of an accurate and very detailed record of land use but also a reasoned interpretation of observed fact which could be viewed alongside published official reports and statistical material. The authors so arranged their share of the work that they were able to visit all regions of the

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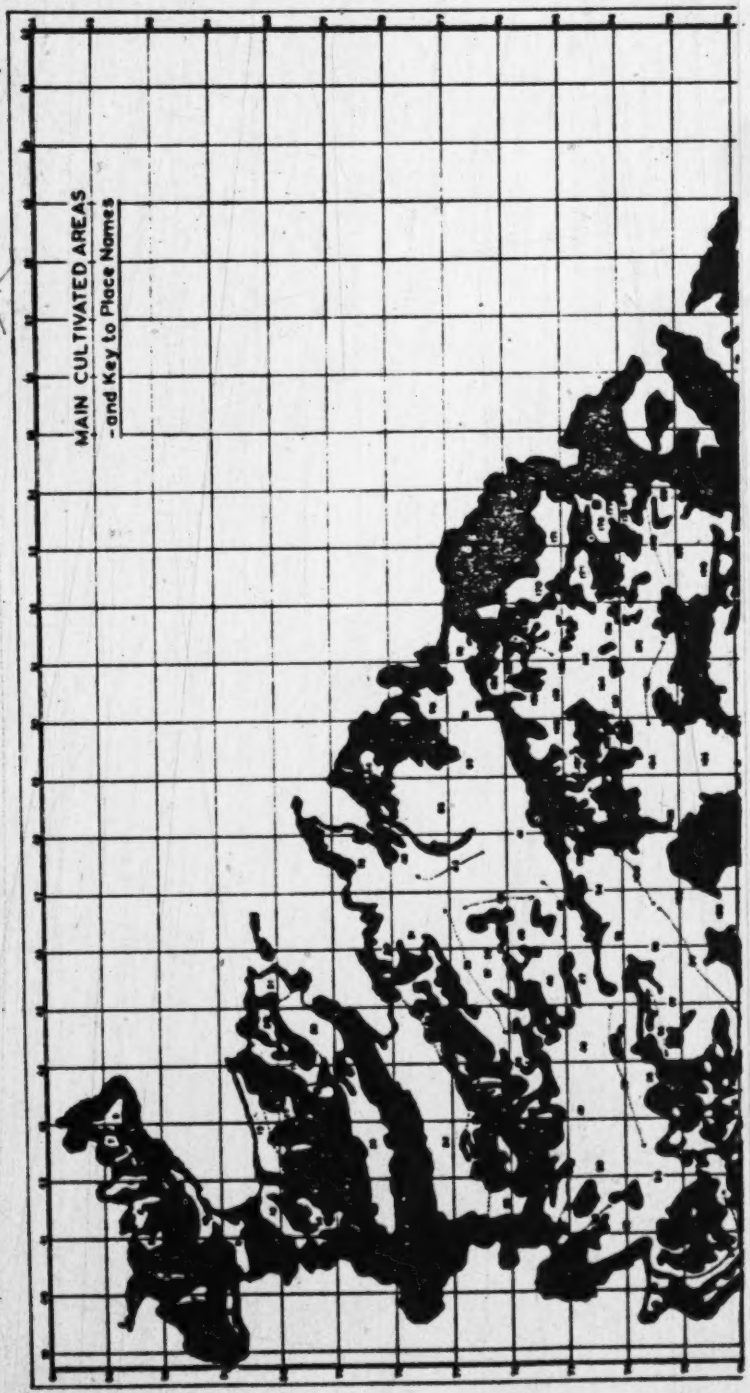

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Fig. 69 Main Cultivated Areas and

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Fig. 69 Main Cultivated
d Areas and Key to Place Names: Malta.

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Islands and could thus provide continuity in the interpretation of the records of the many field workers. 311* 114

The survey parties worked in the Islands during the months of March and April in each of the three years 1955, 1956, and 1957. In March-April and August-September 1958 the authors themselves carried out final checks. During the Spring periods, the use of fairly large teams of observers, between six and eight in number, enabled the work to be concentrated at a critical time when the widest range of crops and of activities are to be seen. Summer vegetables and cotton are the only major crops not then in the fields and this difficulty was overcome by the enlistment of the other Durham research workers permanently residing in the Islands and by a summer visit of one of the authors. Objection might be raised to the spreading of the survey work over more than one season. The difficulty of completing such work on such a scale during one short period of time is not a sufficient answer. The real answer is that the time spread did not matter. The miniscule field pattern and the further subdivision into separate plots, both amply illustrated in the examples shown here, mean that crop changes from year to year merely result in the re-shuffling of tiny pieces of an intricate mosaic. The variety of crops grown and identified (see below), the relative uniformity of crop sequences and the individuality possessed by the various regions, further remove any deficiencies apparently implied by this particular method. The spreading of the fieldwork over a number of years did in fact allow both the checking of methodological validity and the carrying out of subsidiary pieces of work. For example, sample areas were surveyed during each of the four years, thus giving an accurate picture of crop sequence and rotations, as well as a check on short term change.

The following crops were individually identified in the field: sulla, wheat, barley, vines, fruit, olives, potatoes, onions, tomatoes, marrows, other vegetables, broad beans, peas and vetches. In addition, uncropped land was recorded as waste, fallow, rough grazing or tilled. In several cases, e.g. vegetables, fruit and vetches, a note was made of the actual variety of plant being grown, e.g. cauliflowers, artichokes, apples, peaches, lemons, *gilbieha*, *zozfa*, *widna*, etc. Coloured maps on a 6-inch scale, showing the 18 different crops and uses of land have been prepared. Cost of publication prevents their reproduction here, but they have been used in the preparation of this volume, particularly in Chapters VII B and VIII. The Land Use Maps (Figs. 69 to 98) show the distribution of individual crops, though the range distinguished has been somewhat curtailed. Wheat and barley, tomatoes and marrows, the various vegetables, broad beans and peas, and vetches and minor fodders have respectively been combined into single maps although the accompanying text notes regional variations. These 14 distribution maps in black and white have been prepared by reduction from the coloured 6-inch series. They were originally prepared on a 2-inch scale, and were thus directly comparable with the standard 2-inch topographical sheets and with the 2-inch geology and soil maps. The distribution maps, together with the coloured 6-inch are at present stored in the Durham Geography Department and it is hoped that the former at least will eventually be published on a 2-inch scale. The amount of cartographic work involved has been at least as great as that done in the field, and, since it was carried out by the authors alone it has consumed a considerable amount of time. However, it is felt that the labour has been justified in that only by accurate cartographic representation and by deduction from the maps can easy generalities be avoided. The long term character of the project also made easier the establishment of friendly contacts with local individuals, both official and private, whose help is sincerely acknowledged, and at the same time allowed the authors to amass a background knowledge of the Maltese Islands which has been invaluable in their interpretation of the agricultural landscape. [241] 102 311* 126

Note. A preliminary report - 'Agriculture in Malta, a survey of land use', was produced by H. Bowen-Jones and J. C. Dewdney, at Durham, in 1958. 113

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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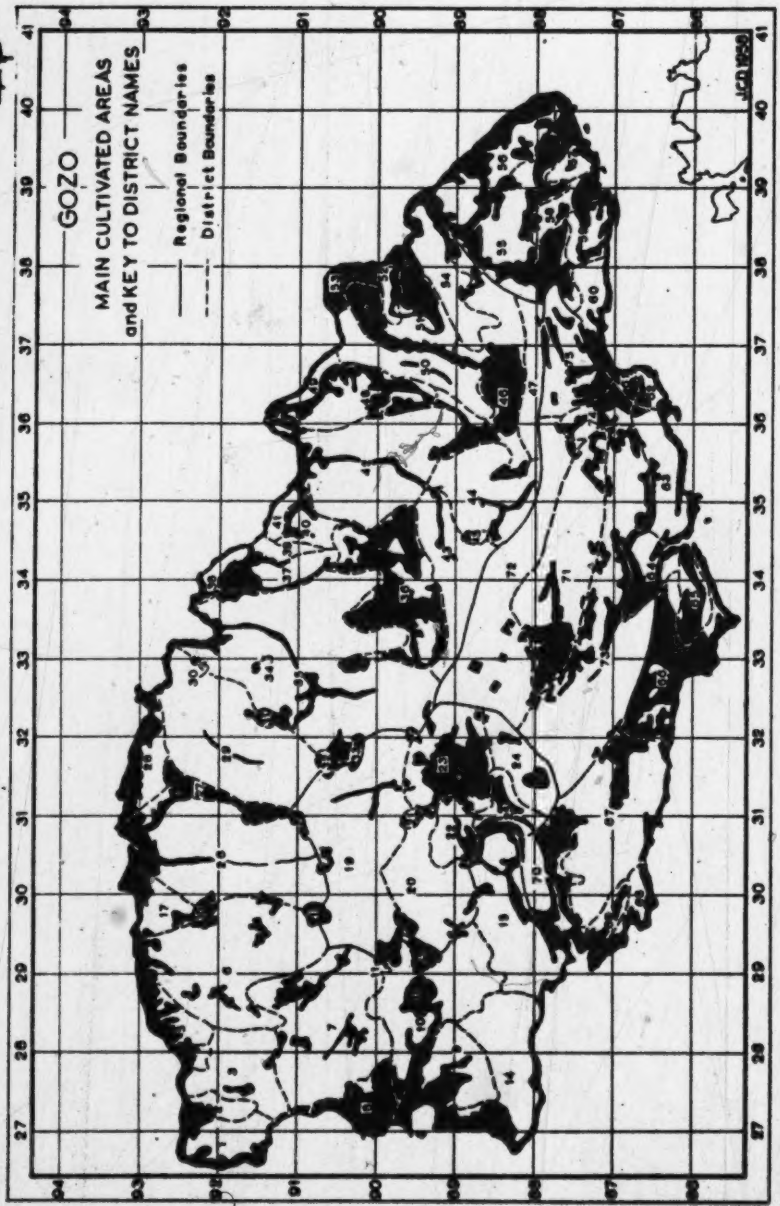

Fig. 70 Main Cultivated Areas and Key to District Names: Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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B. Crop Distributions

FIELD CROPS

CEREALS - WHEAT and BARLEY (*Qamh and Xghir*)

As the land use maps show (Figs. 71 and 72), cereals are grown in all regions of the Islands. Of the grains, wheat and barley alone are of importance. Some maize and millets are still grown and a few fields of sown oats were observed. *Mixta* - a mixture of wheat and barley - is now rare, although self-seeding produces some mixtures difficult to distinguish except by close examination. The practice of sowing spoilt or 'bottom of the bag' grain on odd patches of soil that would otherwise bear nothing also produces unexpected results.

Many different varieties of wheat and barley are grown - naked and bearded, short and long-awned, with short, stiff and long, weak culms. So-called 'Maltese' varieties such as *Qamh ta'Susa* and *ta'Bla Sifa*, have little homogeneity except that the wheats are all hard, bearded types. Introductions are mainly of durums from Canada. The local barleys are poor in type - short-eared, small-grained, 'dry' varieties, although the poor results are obviously partly explained by their use for cropping the harsher lands. The new barleys are also mainly of North American origin and selected for early maturation. This latter characteristic is especially of value in an environment in which barley may dry and shatter rather than ripen - this has been observed even as early as March. In so far as barley is a residual land crop, however, then innovated varieties would seem to be difficult to establish and popularise - especially since the farmers on the poorest land are the least able to indulge in experiment.

That the importance of cereal cultivation remains so great, in spite of growing dependence on imported bread grains, seems strange at first sight. Information supplied by local mills suggests that human consumption of local cereals is very small, but quantitative estimates cannot accurately be made at present. Little is known of the relative importance of domestic subsistence on the farmers' own grain crops. Davy, in 1842 (1), and witnesses before the Royal Commission of 1911 maintained that production was mainly for domestic consumption. This is still obviously true for some vegetable crops and poultry but, in the present period of continued transition from peasant farming towards commercial farming, is difficult to evaluate for cereal production. For general purposes we may however presume the validity of the assumption that Maltese-grown grains have become less important for human food. No significant amount, it is generally agreed, is used for distilling and brewing. The former is severely restricted by law, and the latter by the general unsuitability for malting - unevenness of sample is a major difficulty - of local barley. For use there then remains only production for livestock fodder - particularly for horses and cattle, although the value of a grain ration for pigs is becoming more apparent with the introduction of better breeds such as the Large White. Given this situation, the comparative ease of grain-growing in the usual rotations practised, and the difficulty of finding alternative crops for some hardland areas, results in the survival of what has been called *grande culture* - land use of which would seem to be, in many regions at least, unnecessarily extensive.

The matter of rotation is fairly simple. Debono (2), in 1911, pointed out that, after previous manuring and vegetable growing - 'there is only the sowing and the crop comes by itself. So that whether there be duty or no duty, wheat will always be cultivated here in Malta, unless there is a revaluation in the rotation of crops'. A contemporary example may be taken from a farm at tad-Dahla. On the poorer land, wheat is grown alternate years with sulla. On the better land, potatoes and vegetables are the main crops and wheat, sown incidentally as a rotation crop, then gives yields of 25-28 cwt. per acre - double that on the other fields. Any change in the proportion of wheat to other crops under this system of farming could only be a consequence of an agricultural revolution.

More complex is the importance of the grains as hardland crops. Basically, wheat and barley are dry farming crops in Malta. Without irrigation, even away

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1: Bowen-Jones et al. K-5 (1955-1958) 1961

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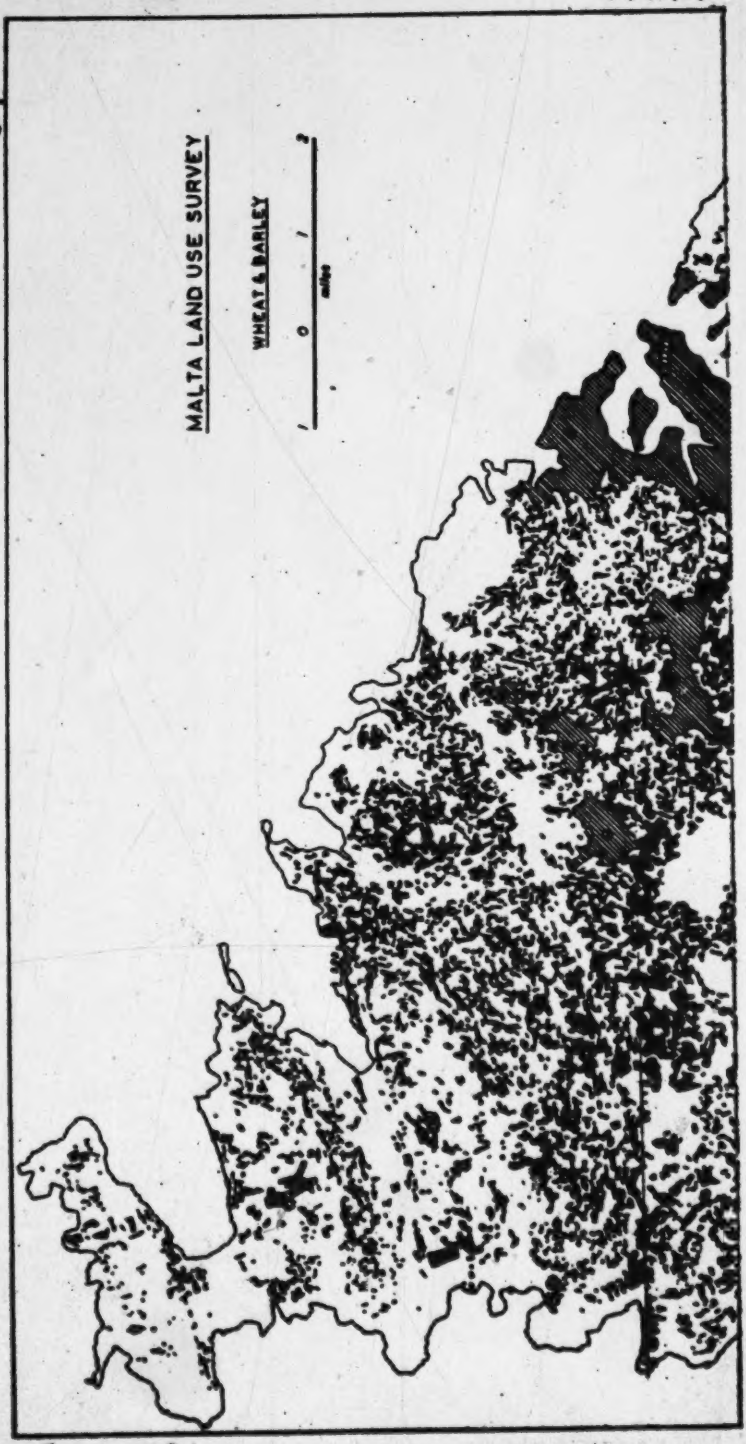

[p. 196-A]

Fig. 71 Malta: Land Use Survey;

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Fig. 71
Land Use Survey: Wheat and Barley

[p. 196-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

311* 243

from the *terre accidentée* which borders the Wied Incita and the Wied il-Kbir, the light Globigerina soils can only well support the grains and sulla. Even more striking is the fact that both in areas where irrigation water is comparatively abundant, as in the Wied l-Iemu (south-west of Rabat), and on the relatively deep and fertile soils of the Bingemma Lowlands and the Wied il-Ghasel, wheat and barley are treated as crops which make little demand on water, manure and tillage and therefore they are to be found in the same environments as intensive market gardening. On the bleaker or less well mantled hillsides, barley, patch sown between rock outcrops, or regarded as a catch crop gamble, usually becomes supreme. It is the more surprising therefore that average yields are relatively high (wheat and barley 22.4 bushels per acre for the decennial period 1949-58). It is doubtful however whether any but a small fraction of the hardland crop yields are represented in statistical returns, particularly since much of these crops are individually inter-cultivated with other crops such as peas and vetches. Even on good land, a considerable total acreage of cereals must avoid statistical measurements - the narrow boundary demarcation hedges of barley in the Wied tal-Pwales and the windbreak ridges of wheat near Ghajn Tuffieha.

Moreover, and here appears the crux of the matter, most of the poor grain crops and a large proportion of others are pulled green for fodder rather than threshed for grain. This is true not only of *Ferrana* - green barley - but also of much of the wheat. This use of the cereals as grain and 'hay' crops give them an extra value in that land under wheat and barley is not necessarily unusable for other crops for the full life cycle of the grains. The danger here lies in the deprivation of the soil of a great deal of organic matter that might be more profitably used for other crops given a revaluation of rotations, and in the encouragement of soil blowing, particularly in the windy Spring months, by the removal by pulling of the whole plant. Stubble-mulch farming so often associated with the 'Ard' is by no means general in Malta.

As shown in Fig. 71, in Malta, only in the high-value heavily irrigated Wied tal-Pwales are the cereals other than dominant. Other points of significance are best examined regionally (see Chapter VIII). In Gozo (Fig. 72), wheat and barley predominate on the most level Globigerina platforms lying below the sulla-clad clay slopes. They are unimportant only in the tree-crop zone north of Nadur.

The differentiation between cultivation of barley and wheat in general is essentially one between hardy and less hardy grain types.

FODDERS AND FORAGES

311* 246

Sulla, green barley, vetches, lucerne, chickpeas, the 'caterpillar plant' (*Vicia*) and broad beans are the main forage crops. The leguminous character of all the forages, excepting barley, is worthy of note, and of the herbs gathered as 'wild' hay, by far the greatest number also are leguminous, including among their number many species of *Medicago*.

In the cultivation and use of these fodder crops, there are several features which are peculiar to the Maltese Islands and which deserve close attention. In the first place, all the forages, including sulla which is a true perennial, are grown strictly as annuals in close rotations of the types exemplified in the section on Husbandry (Chapter X C). They are all capable of rapid maturation into 'hay'. This situation is a natural consequence of the virtually unique historical *creation* of most of the tillable land in response to population pressure. All land which is cultivable has to bear at least three crops every two years, and in many cases five or six. Land which is not cultivable is karst; bare, calcareous rock interspersed with small soil pockets and crevices. There is very little land which can be put under perennial pastures or grasses that is not already carrying a close sequence of soil-building and soil-exhausting crops. The introduction of perennials into a system such that, even in the dry-farming regions, there is remarkable diversification would be as revolutionary as the displacement of leguminous forages by other types.

Secondly, fodders are almost invariably cut green or as hay crops and stall-fed to livestock. The peripatetic herds of goats and sheep which live on the rock

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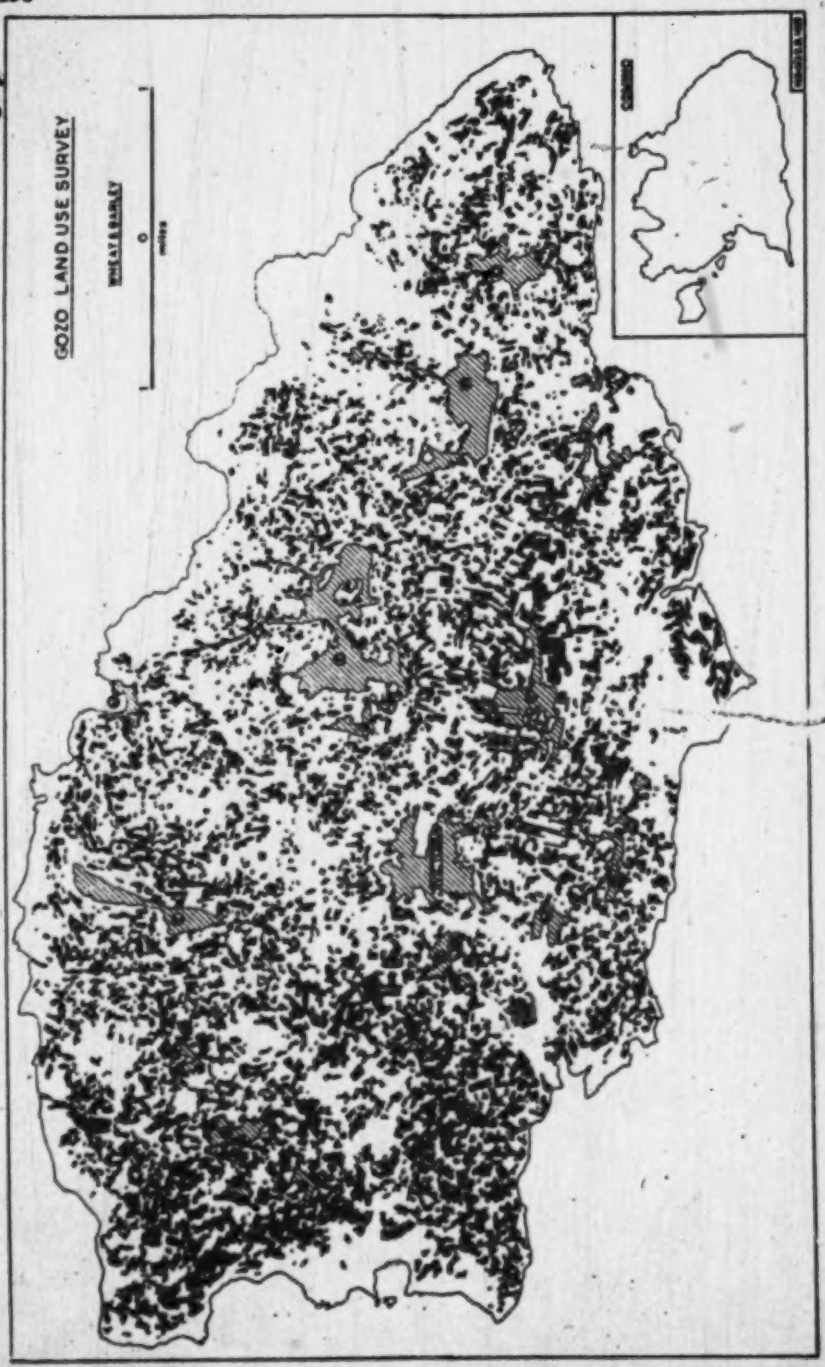

Fig. 72 Gozo: Land Use Survey: Wheat and Barley.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

wastelands and roadside verges are occasionally turned on to sulla fields and on to bastard fallow but that is all. This, too, is a necessary consequence of the pressure on land resources mentioned above: land is too precious to be used as pasture or even as true fallow *vaine pâture*. A consequent disadvantage is that, in the enforced absence of folding, dung is expensive and rarely applied.

Thirdly, much more than in other Mediterranean areas of dry farming, the Maltese cultivators are already alive to the necessity of raising cash crops which are also rotation crops, and are capable of choosing multi-purpose plants for catch-drop use. Broad beans, together with bread and *pasta*, form the basis of the countryman's diet but are also used as horse and mule fodder, depending on crop quality and ruling prices. Chickpeas similarly have alternative uses as dry fodder, green vegetables or coffee substitutes. Fodder crop improvement or change is therefore not simply a matter of elevating standards of primitive farming, but implies an agricultural revolution.

Given this situation, it would seem that there are only two reasonable methods of increasing fodder production in the near future, assuming that such an increase is desired. The first is that of devoting more scarce irrigated land to leguminous fodder production. From the economic point of view, any diversion of land now producing irrigated vegetables to forage growing would be of doubtful value. Malta, even now, is not self-supporting in vegetable crops such as tomatoes, and dietetically would probably benefit from an even greater consumption of green vegetables. Though a net exporter of potatoes and onions, Malta has to import unnecessarily large quantities of these same products. Moreover, as examined in connection with Vegetables and Fruit Crops (pp.213-219), the use of irrigated land for fodder growing would debar the development of Malta's only possible large-scale exports - fruits and early specialised vegetables. The loss of such an important export possibility would weigh heavily against the gain in the production of fodder.

The second possibility is that of the replacement of the poor wheats and barleys by new hybrid sorghums. Here too there are difficulties. Though sorghums generally have low transpiration rates, their large leaf areas make them more dependent on subsoil water than the short, local barleys. On the other hand, they survive early droughts better than most grains. A second possible danger lies in our ignorance concerning their vulnerability to indigenous insect pests. The third difficulty is social. The poor barley lands on which sorghums might be grown, as indicated earlier, are those in which terrain makes it most necessary for continuous and arduous manual labour to be applied. It is precisely these areas, vulnerable to soil erosion, which are most likely to be neglected or abandoned by a society with rising living standards and demands. Nevertheless, here may lie both an easy and efficient way of improving and increasing fodder production without mortgaging the future of the best lands.

SULLA - HEDYSARIUM CORONARIUM L.

Sulla, the most important fodder crop, is a perennial legume indigenous to the Mediterranean. The variety *Africa* or *Gaulitana*, erect, slightly branched and often growing 4 to 6 feet in height, is usually found, particularly in Gozo: the more prostrate and finer foliaged varieties such as *Diffusa* and *Prostrata* are more recently introduced and less common.

Matured seed is sown in late summer and it germinates after the first autumnal rains, flowering between March and May. It is then usually cut or pulled and either used as green fodder or, more commonly, sun-dried as hay. Little affected by pests and diseases, sulla develops luxuriant foliage and extensive root systems. It therefore provides good anti-erosion soil cover as well as possessing excellent powers of nitrogen fixation. Water requirements are lower than for any of the cultivated *Trifolium* or *Medicago* plants. In first flowering, its protein content is high, but some of the fodder quality is lost by the delaying of harvesting until the yield in volume is highest and also by poor storage. Much sulla is sold off the farm.

As Fig. 73 shows, the distribution of sulla in Malta corresponds in general with the distribution of cultivated land, but it is noticeably less important in

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1: Bowen-Jones et al. K-5 (1955-1958) 1961

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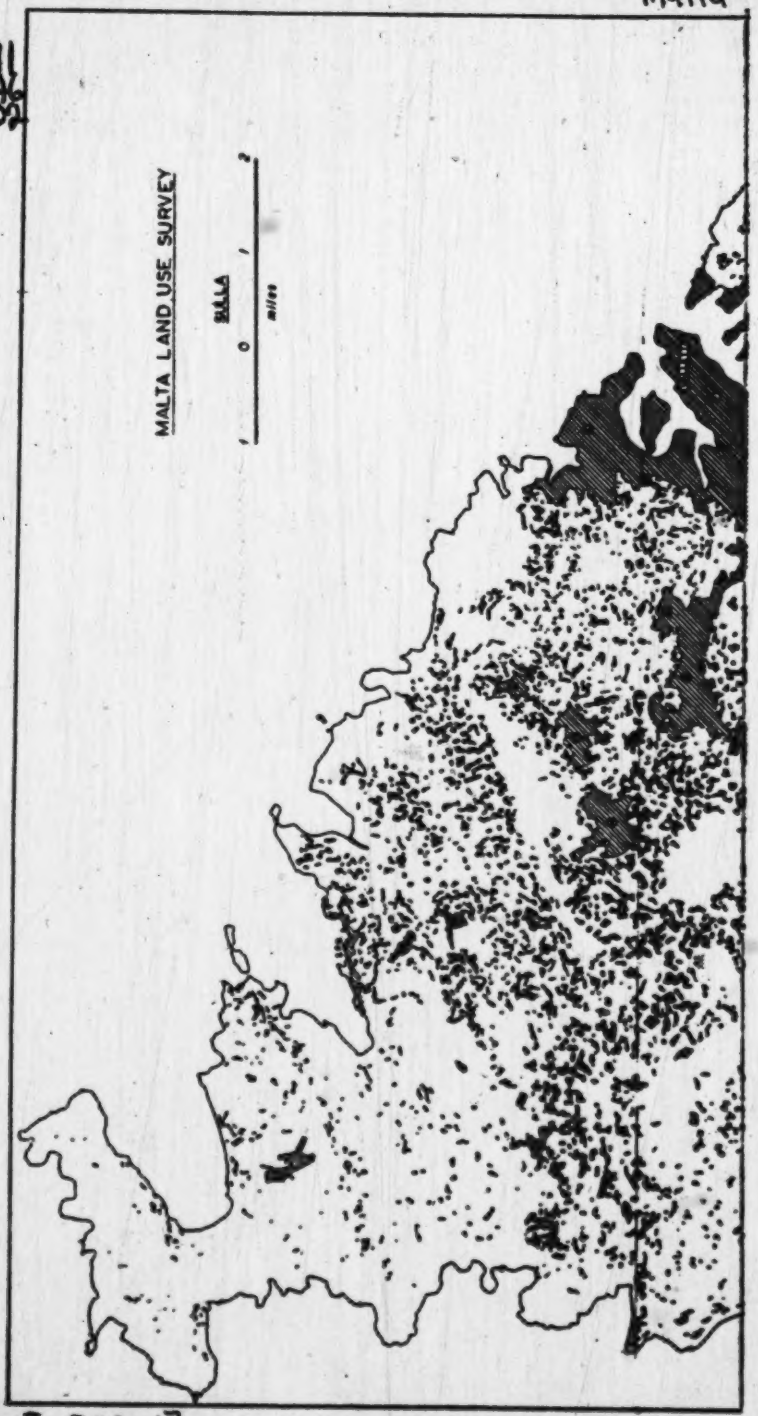

[p. 200-A]

Fig. 73 Malta: Land Use Survey: Sulla.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Fig. 73
Malta: Land Use Survey: Sulla.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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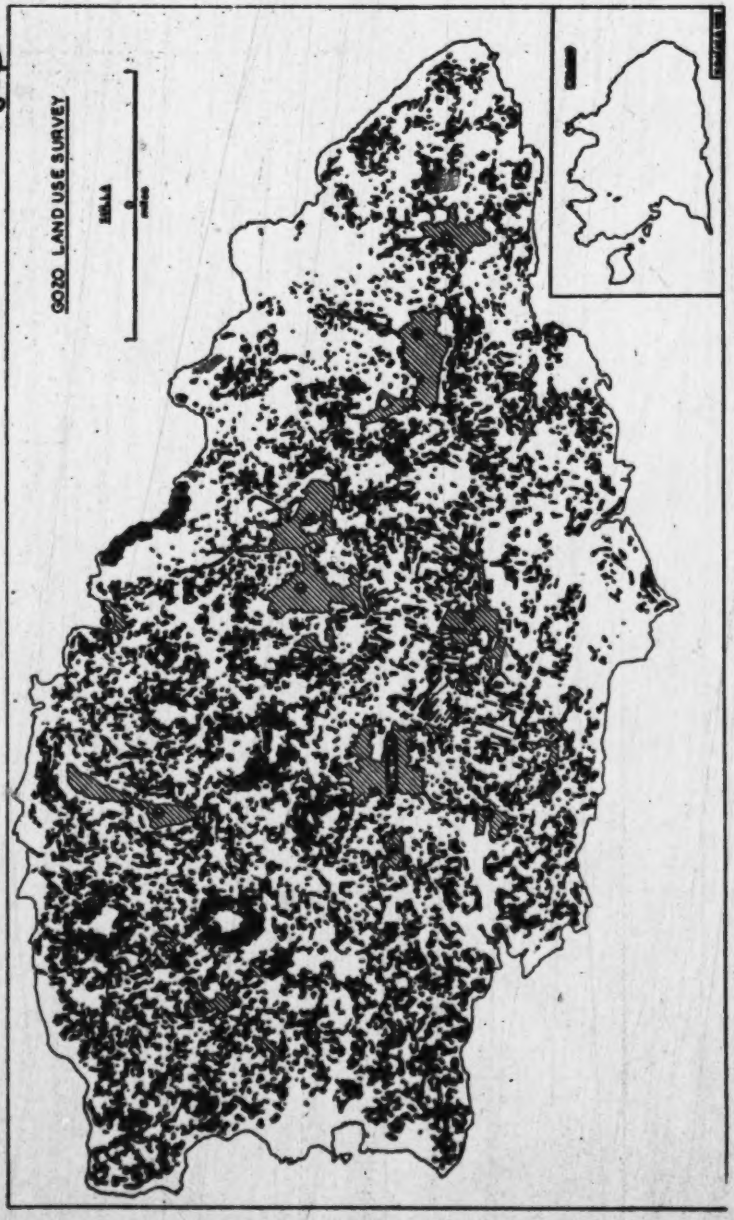

Fig. 74 Gozo: Land Use Survey: Sulla.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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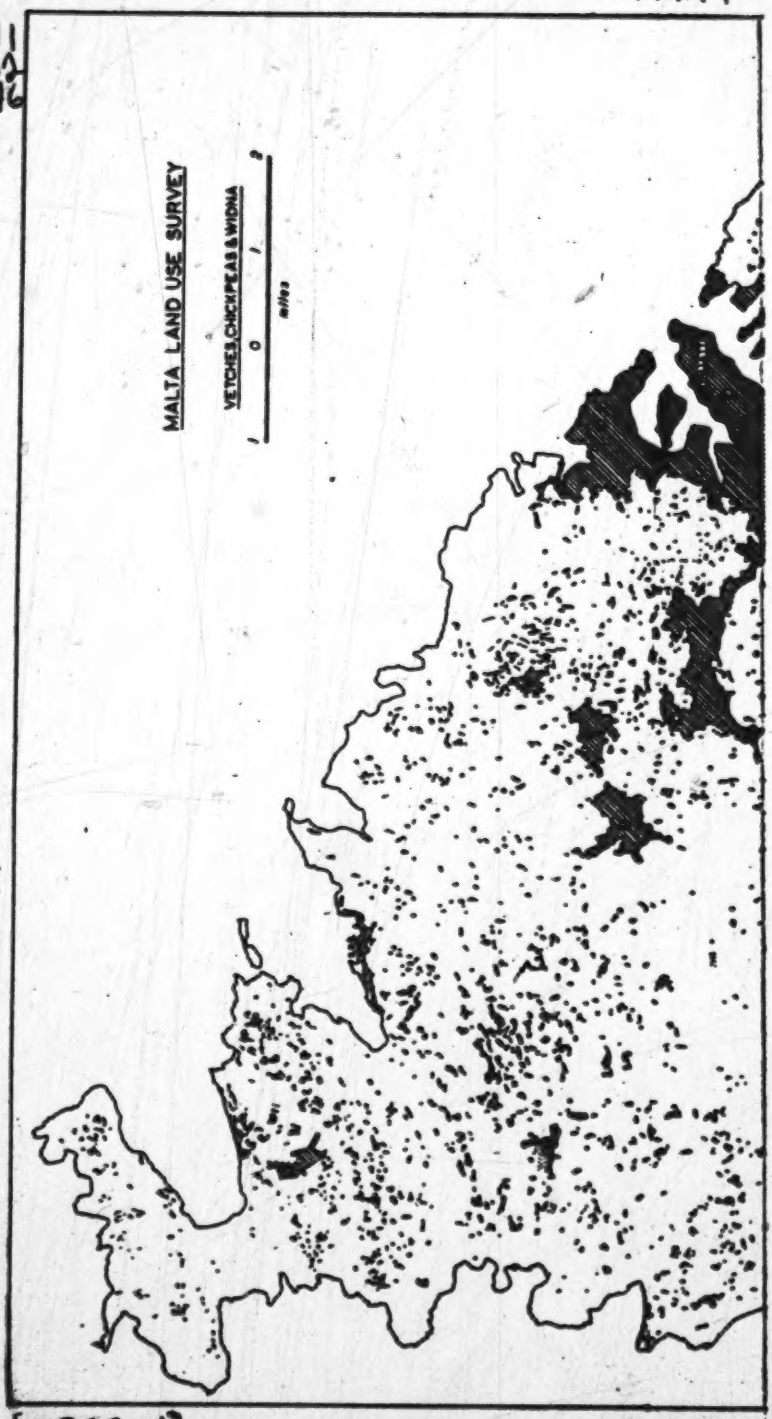

[p. 202-A]

Fig. 75 Malta: Land Use Survey: 1

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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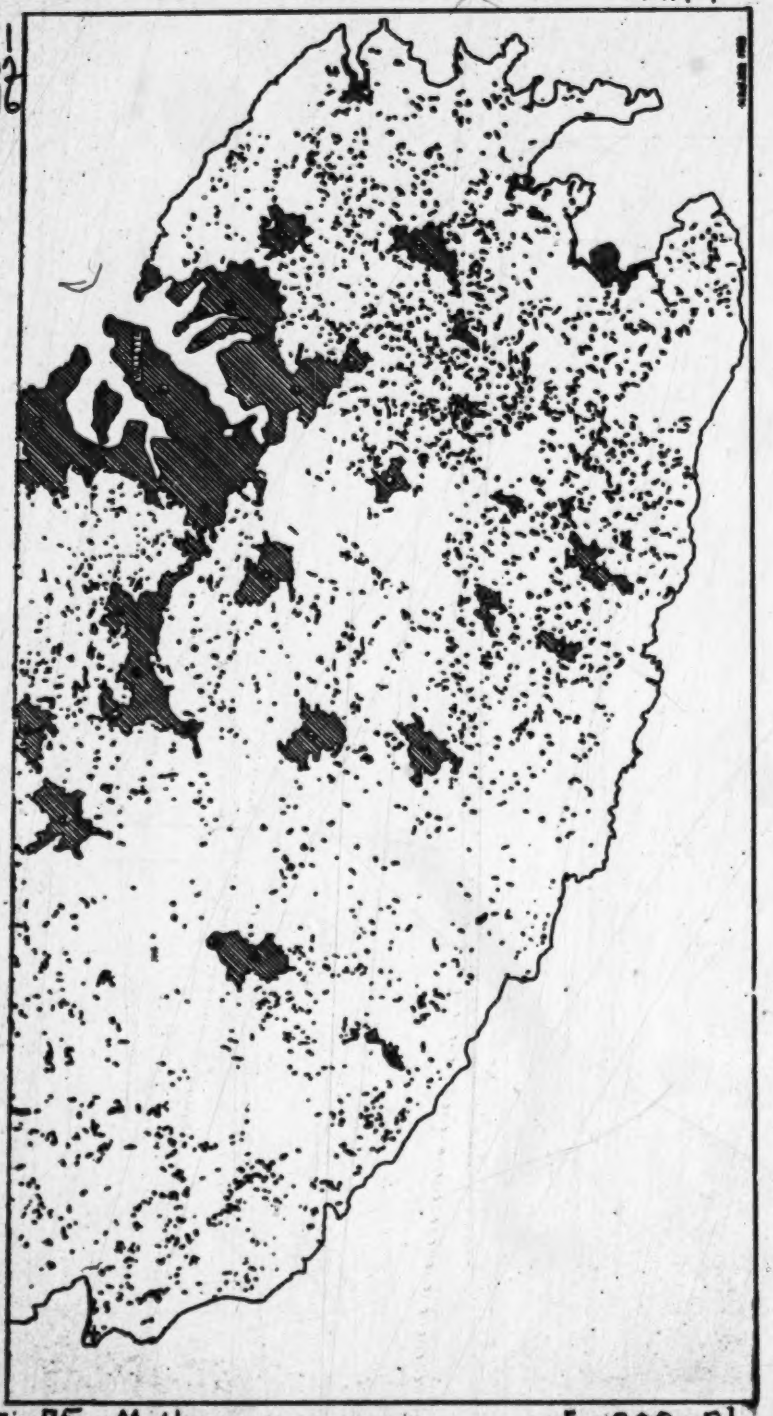

Fig. 75 Malta:
Land Use Survey: Vetches and Chickpeas.

[p. 202-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

well-watered areas. The clay slopes carry perceptibly less sulla than the Globigerina regions, while the crop is almost absent from the irrigated depressions of the Upper Coralline zone, i.e. Wied tal-Pwales and the Marfa oases. It is also fairly sparse on the higher and more exposed thin-soiled lands. Thus sulla may be said to be ubiquitous save that in extreme environmental conditions it is replaced either by poorer but hardier fodders or by higher value cash-crops.

Fig. 74, of sulla cultivation in Gozo shows some striking contrasts. The only area in which it is not of importance is the tree-crop zone lying north of Nadur. In the whole of the Western and Northern regions, sulla, annual or self-seeded perennial, almost completely mantles the sweeping clay slopes. Some difficulty has been experienced in attempting a differentiation between cultivated sulla and 'natural' rough pasture. Fig. 94, was therefore devised (partly) to include this latter category of land which is almost absent in Malta.

The main reasons for the relatively great acreage of sulla of all kinds in Gozo are to be found, first, in the character of the land, secondly, and in part consequently, in the character of the economy. The Blue Clay slopes lying below the small surviving fragments of Upper Coralline Limestone are as a whole less well watered and make more intractable dry-farming land than those of Malta. Exceptional are the series of Wieds on the northern face of the Nadur upland which are given over to tree-crops and vegetables. Livestock plays a greater part in the farming economy of Gozo than in Malta and hence sulla ranks roughly equal in acreage with the cereals. Conversely, the absence of any large Gozitan urban market for vegetables, together with the relative difficulty of transporting such commodities regularly to Malta, reduces competition for the better land. (See also p. 287.)

VETCHES AND CHICKPEAS

Included in Figs. 75 and 76, are several other much less important fodders excluding lucerne. The minor forages and fodders are generally found in small fields and patches throughout the cultivated area. *Widna (Scorpiurus Muricatus* var. *Subvillosus L.*) is both cultivated and gathered wild for goats and rabbits and to a lesser, traditional, extent for fat cattle:-

'Il-fart li jiekol il-widna jagħmel il-laħam bil wiżna' = 'Cattle which feed on widna put on flesh by the wiżna'.

Chickpea or *Gram* (*Cicer Arietinum*), because of the irritating toxicity of the juice, is best used as a dry fodder. Vetch (*Vicia Sativa*) is most often grown on small or exposed terraces of good soil. Bitter vetch, *'Żolfa'* (*Vicia Ervillia*), has some of the disadvantages of *Gram* but is more suitable a crop than sweet vetch for arid areas, and for land topographically difficult for successful sulla. Lucerne, in the Maltese Islands, has ranked as a minor fodder because of its high water needs. The total acreage is still small and it is not cultivated except as a summer irrigated or watered crop.

In Malta, these minor fodders are most important in the Eastern regions where small holdings and part-time farming are most common. They are of considerable total significance on the Upper Coralline hills where they supplant sulla, broad beans and peas because of their greater resistance to exposure and tolerance of poor, thin soils. Similarly in Gozo they are most commonly found in areas of difficulty such as the eastern uplands and the hills south-west of Sannat.

BROAD BEANS AND PEAS (*Ful* and *Piselli*)

As noted earlier, these two crops are undifferentiated in Figs. 77 and 78. No significant regional variations in the distribution of these crops is to be observed. They are grown in all cultivated areas, usually in small plots, the beans occasionally inter-rowed with barley in larger fields. This is a natural consequence of their tolerance of a wide range of conditions and of their dual use, already noted, as food and fodder.

3 A [See p. 229--Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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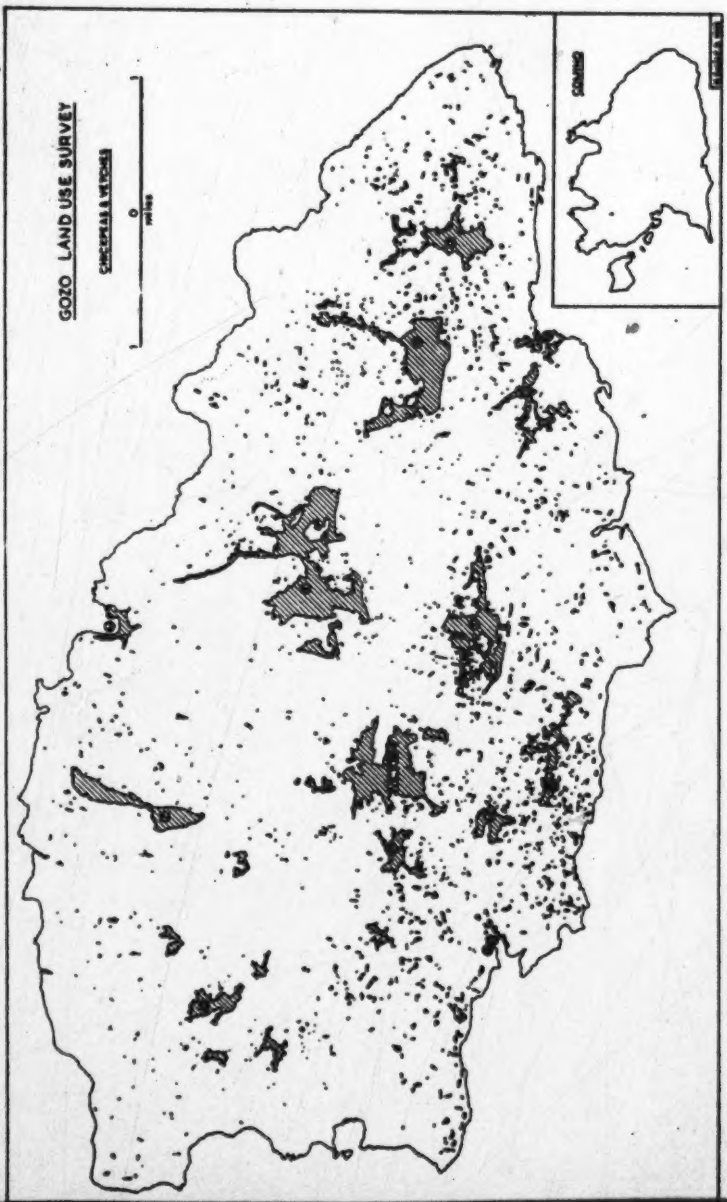

Fig. 76 Gozo: Land Use Survey: Vetches and Chickpeas.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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POTATOES (*Patata*)

Potatoes have been for some years the most important commercial plants raised in Malta. First introduced in the early nineteenth century, the acreage used for spring potatoes is now greater than that for any other crop, and the value of potato exports has been exceeded only by that of scrap metal (during the abnormal post-war years of 1951 and 1952). Spring and winter crop acreages combined take up 15 to 20 per cent. of the cultivable land. 311* 244 439]

The cultivation of potatoes varies with season and type of land available. The export crop is entirely raised from imported seed. This is planted in December or early January and the crop is ready for lifting from late March onwards, depending on weather conditions during the growing season. The seed, which accounts for most of the total potato imports, is necessary in order to ensure disease-free, good-yielding stock and its use is economic only as long as a high-price market for early potatoes can be found in Northern Europe. On dry soils which quickly warm up in the Spring and which give a fine yet loose tilth, and under climatic and soil conditions which on average are well-nigh optimum for tuber rather than leaf growth, yields are extremely good for the very short growing season. There are however certain hazards. Cool, wet winters delay sprouting and can both reduce and retard the harvest very severely, as in the seasons 1934-35 and 1950-51. Ground frosts in January may have similar effects as in 1936-37. Cool and humid weather during February and March encourages the appearance of blight and over-favours leaf growth - as, for example, in 1955. A more serious hazard is that of winter rainfall deficiency. As can be seen from the weather records (pp. 48 - 52 and Figs. 7, 19, 25), Malta rarely experiences 'average' weather and low winter precipitation can be expected at least once in every five years, e.g. 1957; rainfall: January 3.85 inches, February 0.25 inches, March 0.46 inches, April 0.41 inches. The thin, light soils, which otherwise are so suitable, are very quickly dried by strong winds and yields then decrease considerably. On non-irrigated land of medium quality, the yield is rarely more than fourfold and usually less. A reduction in yield of the order of 50 per cent. means considerable loss. For this reason, a very large amount of the best irrigated land is used for this crop in order to ensure good returns. Total yields are further depressed by the very short growing season, by local mineral deficiencies, by inadequate spraying treatment against fungus diseases, and by poor manuring. The general reliance on sulphate of ammonia is not only misplaced but may be positively dangerous.

The summer crop, unimportant in size and acreage, is obtained from the sowing of local seed in early summer and harvesting in September. This can only be done on irrigated or very fertile land and is entirely for the Maltese market. The winter crop, approximately half as important in bulk as that of the spring, is from local seed sown in early autumn and harvested in December and January. This supplies most of Maltese requirements. In these cases also, vagaries of weather result in great fluctuations in yield.

Potato cultivation on dry and irrigated land makes heavy demands on labour for sowing, tilling and lifting. Since climatic conditions on average give good sprouting ratios, the tubers are usually divided into thirds and quarters for reasons of economy. This economy becomes less marked when hand labour becomes as costly as at the present moment. The heavy water demands of the growing plant make continual hoeing essential, and, since the harvest is short and the crop value highest at the end of April, the demand for labour reaches a dangerously high peak at this time. Marketing of the export potato crop is equally hazardous. The high-priced earlies can only be sold in the relatively wealthy markets of Northern Europe. Freightage is costly, averaging £5 10s. 0d. a ton Marsa to Glasgow. [439]

Official policy is to encourage the replacement of varieties such as Arran Banner by earlier varieties - 'scrapers' - of wider market appeal. The economics of early potato growing are further complicated by the year-to-year fluctuations in acreage. These variations correspond to a year's time-lag in reaction to changes in market price. Thus, in 1957, a glut, which resulted from market rather than producing conditions, was followed by a surplus of seed and 311* 244 439

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1: Bowen-Jones et al. K-5 (1955-1958) 1961

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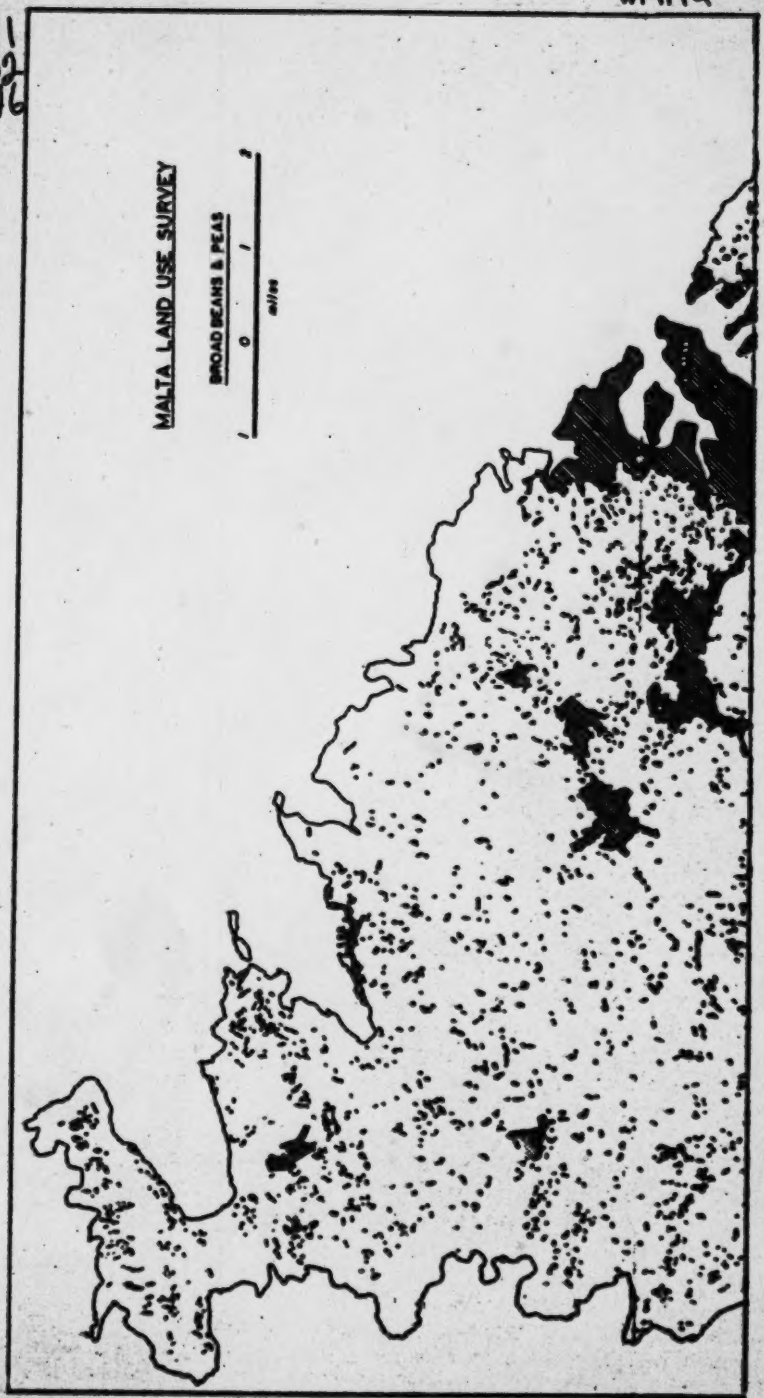

[p. 206-A]

Fig. 77. Malta: Land Use Survey: Broad Beans & Peas.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Fig. 71 Malta:
Land Use Survey: Broad Beans and Peas.

[p. 206-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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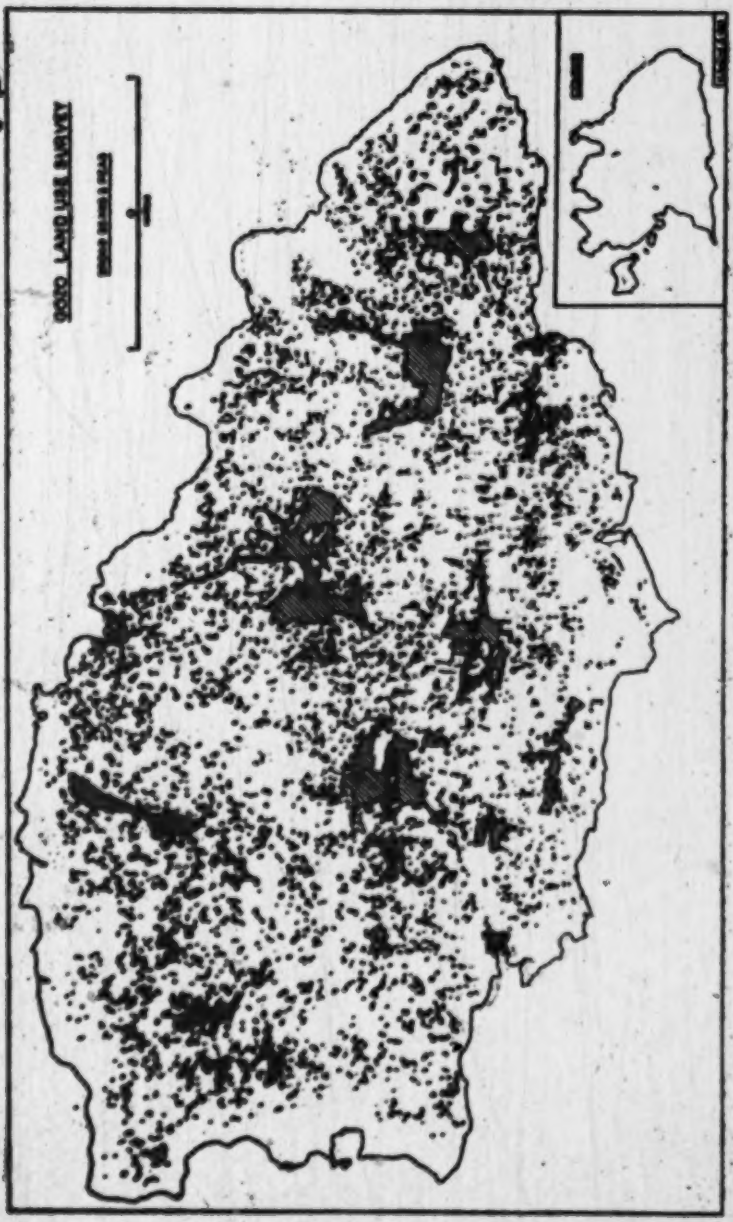

Fig. 78 Gozo: Land Use Survey; Broad Beans and Peas.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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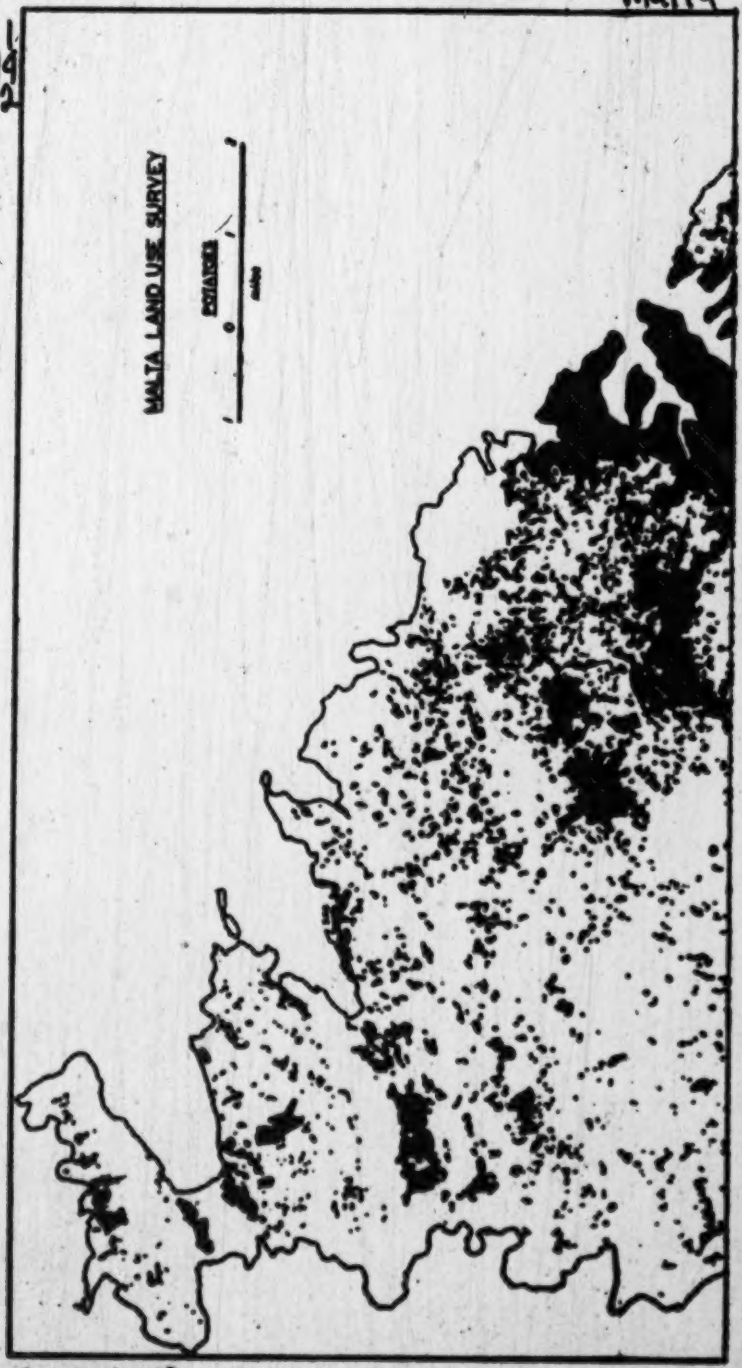

[p. 208-A]

Fig. 78 Malta: Land Use Survey: Potatoes.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

EZ6 Malta EZ6

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Fig. 79

Malta: Land Use Survey: Potatoes.

p. 208-B

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Fig. 80 Gozo: Land Use Survey: Potatoes.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
E26 Malta E26
GOZO

1: Bowen-Jones et al. K-5 (1955-1958) 1961

EZ6 Malta EZ6
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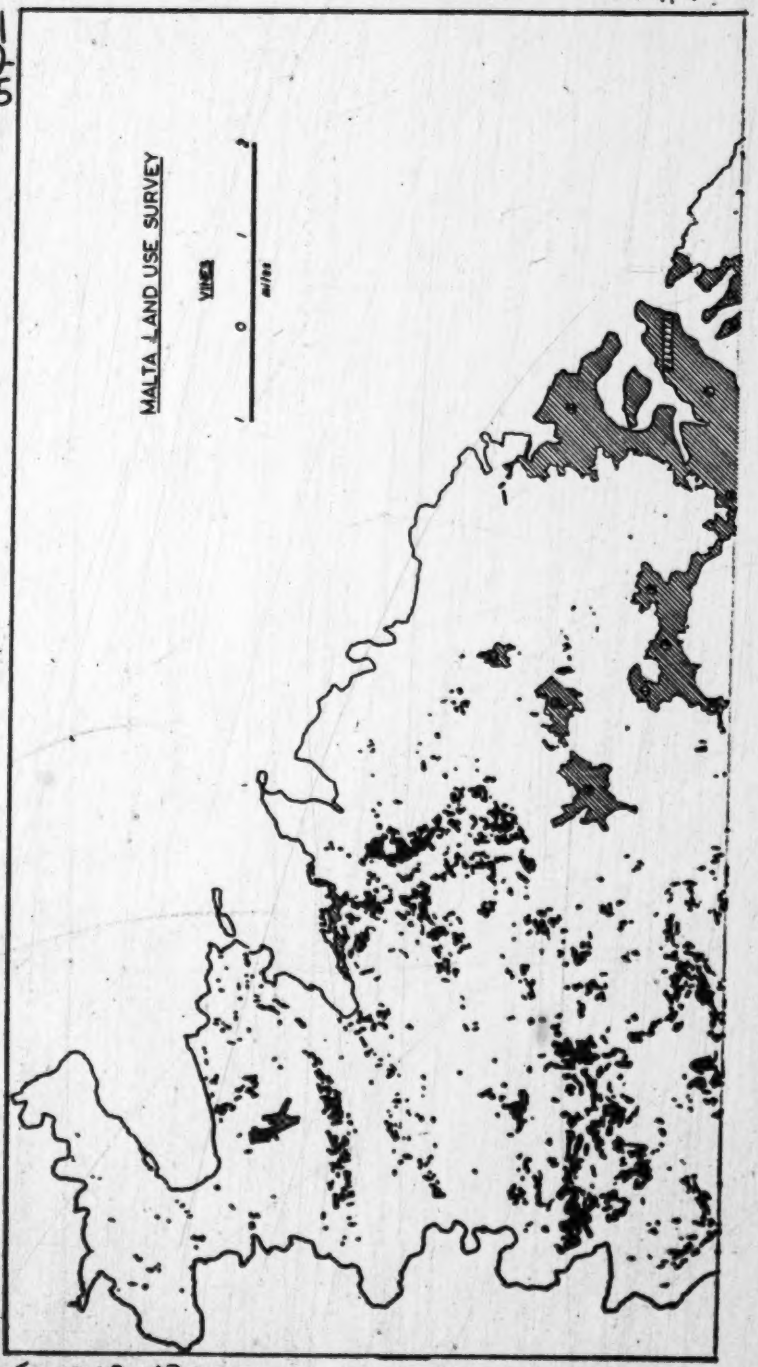

[p. 210-A]

Fig. 81 Malta: Land Use
Sources: Maps

1: Bowen-Jones et al. K-5 (1955-1958) 1961

EZ6 Malta EZ6
Malta

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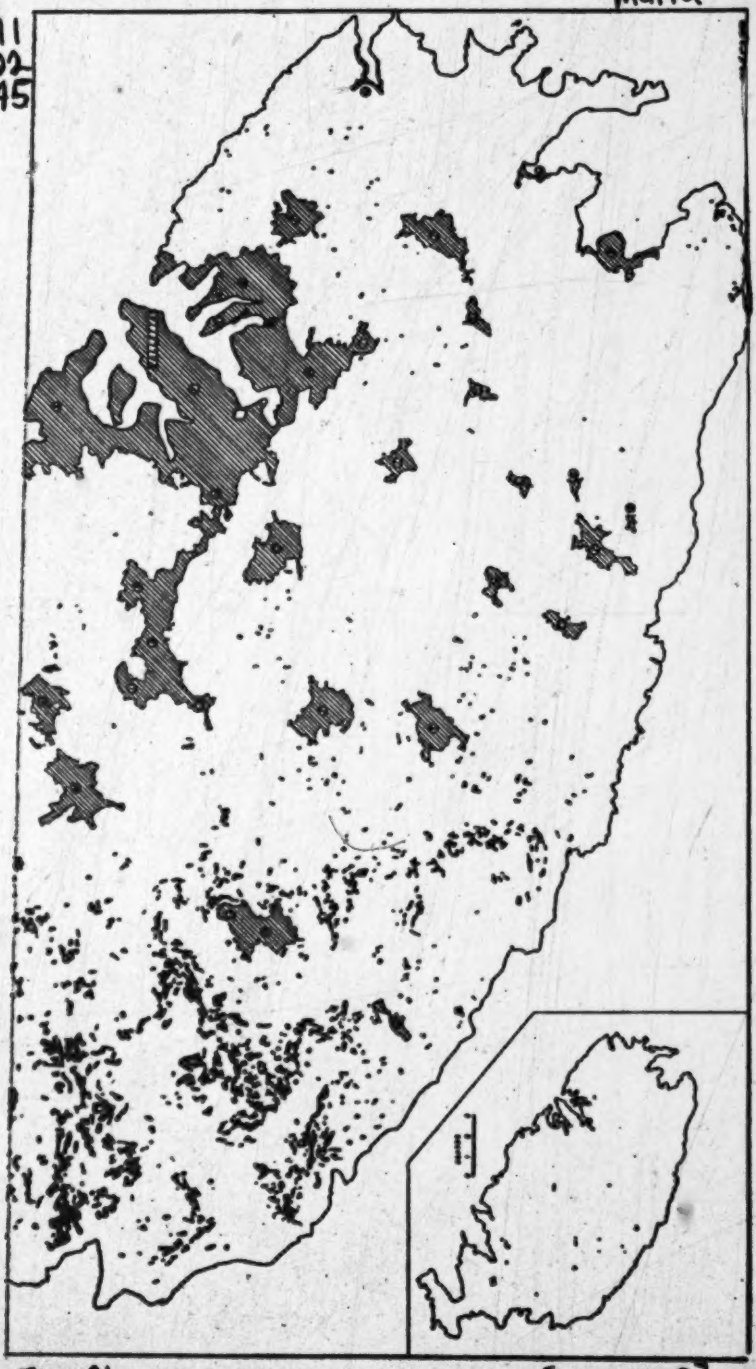

Fig. 81

[p. 210-B]

Malta: Land Use Survey: Vines

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

a reduction in the acreage planted during the following winter. In spring 1958, the export market could have absorbed more than the total production. Official encouragement to re-expand cultivation followed. Moreover, the main importing countries are those in which regulations governing the health of imported crops are most severe, and in which competition is most keen. When to these factors one must add two more, viz. the very high water demands of the crop and its comparatively low bulk value and high freight costs; then a very considerable doubt arises concerning the rationality of this sector of agriculture. On unirrigated land, a potato crop leaves the soil deprived of most of its water. On irrigated land it competes with crops of higher bulk value some of which are already cultivated on a smaller scale, such as strawberries, globe and Jerusalem artichokes, asparagus, sub-tropical fruits, etc. Potatoes require no less labour, no less fertiliser, and are much less amenable to handling by fast land or air transport. The impression left by the crop survey is that Malta has almost somnambulistically developed this specialisation and that the ecological and economic implications have never been seriously examined.

Figs. 79 and 80 show the extent of land under potatoes during March and April. In Malta, the main concentrations are to be found in three different types of region. First, cultivation is widespread on the Globigerina lands. Most intense around the 'casals' and villages of the east and south, it seems more to be associated with human rather than with physical factors (see Chapter VIII). A marked thinning out is noticeable on the higher central slopes rising westward to the Coralline uplands. Secondly, there exist the very important concentrations in the major irrigated basins of the west and north such as Wied tal-Pwales, the Mellieha isthmus and the Marfa oases. Lastly, potato cultivation is of considerable extent on the smaller and more dispersed irrigated plots of the Upper Coralline plateaux, e.g. Hofret ir-Rizz. In the predominantly dry-farmed upland basins of Bingemma and Mizieb, the acreage is relatively small.

Early potato cultivation in Gozo is of much less importance, the island being one further step removed from the export market. Concentration is significantly greatest within easy reach of the settlements. In addition, potato growing is of importance in the tree-fruit and vegetable zones of the north-east. The crop is almost entirely absent from the more remote areas.

TREE CROPS

In the Maltese Islands are to be found a great variety of tree-crops of all kinds on irrigated and non-irrigated land. This variety, exemplified in one field in the Wied Qiejgha which carries apples, peaches, loquats, pomegranates, citrus fruit and vines, is in some ways detrimental to cultivation standards. Only a very few regions are completely devoid of tree-crops. Thermal conditions make possible the growth of a crop range extending from the temperate pome fruits to sub-tropical and tropical types such as the date and banana (albeit with poor results in the latter cases). Low water availability in the soil is the main restrictive factor. Irrigation generally doubles the yields of fruit crops and is essential for citrus cultivation. It is, however, certain that yields could be considerably increased, even on unirrigated land, by improvement of stock quality, by reducing disease and pest infestation and by less intercultivation. One of the main problems in Malta and Gozo is that, as elsewhere in the world, farmers with a strong subsistence-farming streak in their makeup are apt to prefer the security of inter-cultivated poor crops to hazardous but rewarding specialisation.

One non-human factor which makes the arboriculturist's task more difficult is the wind-humidity complex. As noted in Chapter II, the effects of high wind velocity on transpiration and in producing physiological drought are considerable. High humidity, even in summer, produces special problems of plant pathology. Successful competition with more sophisticated producers possessing greater natural advantages seems unlikely.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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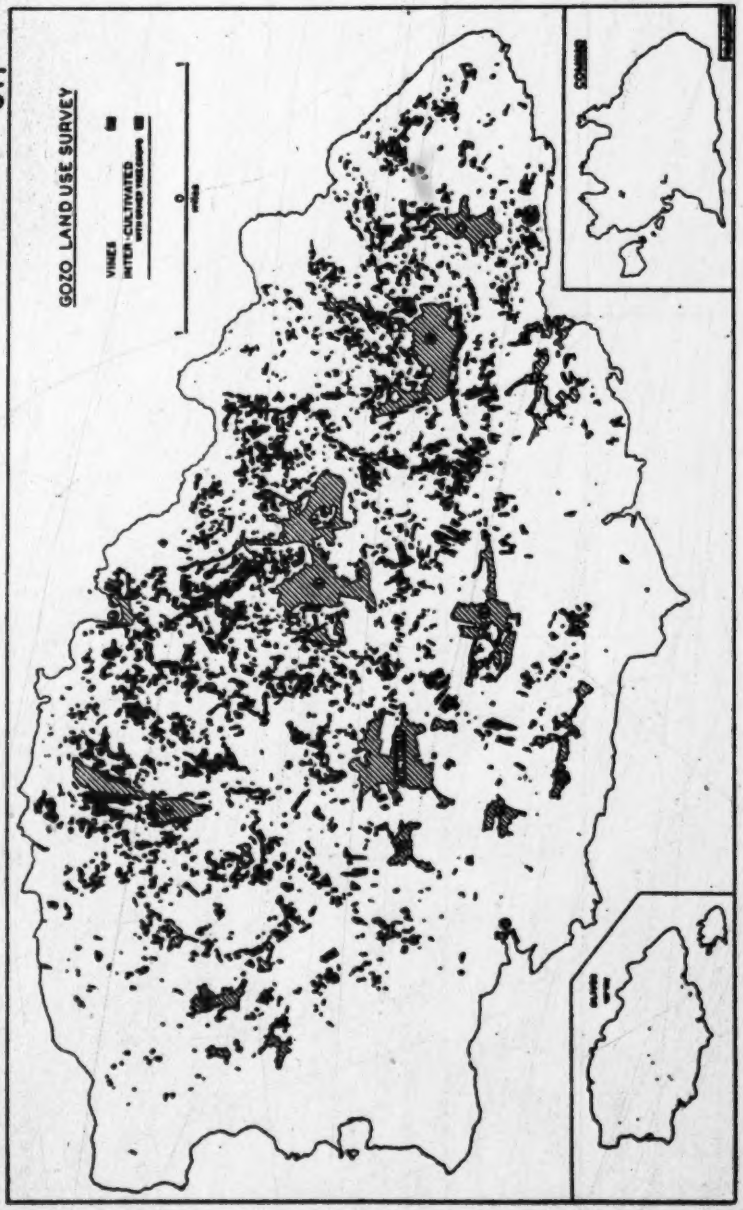

Fig. 82 Gozo: Land Use Survey: Vines.

VINES

Viticulture, has suffered many vicissitudes. Needing irrigation water only for the raising of scions, the vine would seem a crop plant eminently suitable for all but the thinnest dry calcareous soils. No satisfactory reason has yet been adduced for the present absence of 'expertise' in this field, and this unsatisfactory state of affairs is a Mediterranean anachronism. Since Giacinto (3) wondered at Maltese oenological ignorance various improvements havetaken place. Stock is American in origin imported during the Phylloxera epidemic in Europe. Scions are officially imported for grafting and are mainly from France. On the whole, too little specialisation is found, grapes being grown both for table use, fetching prices about £4 per qantar (175 lb. ave.), and for pressing - controlled prices 46s. to 48s. per qantar depending on quality. Commercial success in any other than the home market will depend entirely on whether the viticulturalist can now be weaned from quantity production to quality production. Products at present, while being remarkably good value, are not suitable for profitable export.

In Malta (Fig. 81), there is a striking concentration of viticulture in the western half of the island. In contrast to general Mediterranean practice, vines occupy much of the best watered heavy land of the Blue Clay slopes. Secondly, vines are of importance in the larger depressions with plentiful sub-soil water, for example the Wied il-Ghasel, the Bingemma Basin, and Mifieb. Those cultivated areas of the north and west which rely on pump irrigation - such as the Wied tal-Pwales, and the Rabat-Dingli upland pockets - have little land under vines. Over the remainder of the island, vines are mainly represented by wall- and house-side plants which, mainly for domestic use, are becoming of less importance as field cultivation is extended. This extension of acreage is taking place almost entirely in the traditional regions of the west.

As shown in Fig. 82, viticulture in Gozo, occurs in a great variety of conditions and there is a much greater extent of inter-cultivation with other tree-crops. Such inter-cultivation is particularly found in the *gnieu* zones - the spring line belts lying below the Upper Coralline mesa cappings - as around Żebbuġ and Nadur. North of Nadur, it extends into the Wieds San Blas and Dahlet Qorrot. Except in the remote western lands and on the thin soils of the southern hills, vines are found everywhere; in the central mixed-soil lowlands, in the open northern valleys and on the eastern coastal slopes. This reflects the traditional self-sufficiency of the Gozitan farm economy, a point also brought out by the large number of vineries (see p. 213). The vine is also inter-cultivated with sulla which, undersown annually, is a useful soil-renewing and cleaning crop.

OLIVES

Inset maps, Figs. 81 and 82, Malta must be the only Mediterranean land where the tradition of olive cultivation has almost disappeared. Vegetable oil consumption is high and has to be supplied by imports costing on average nearly £300,000 per annum. Olive cultivation has been more extensive in the past as attested by place names such as Żebbuġ - the place of the olive, and Żejtun - olive tree, and is still perfectly feasible over a great deal of under-utilised land. Various reasons for this strange situation have been mooted, ranging from the completely invalid belief that the olive cannot stand sea-air to the inadequate charge that tenurial security is insufficiently great. The matter is still a mystery.

Recent extensions of planting, particularly at Salinas and on Bajda Ridge, have been Government-sponsored, and the latter case is basically a scheme for the afforestation of a water catchment and percolation area.

CITRUS FRUITS

Because of their large water requirements, oranges and lemons are of orchard importance only along the Upper Coralline - Blue Clay springlines in Western Malta and Eastern Gozo. Scattered trees and very small plots are found in many districts, often in the most unlikely places. The Seville orange, once of considerable importance, is now rarely found and most of the old trees have

[TEXT CONTINUES ON P. 217]

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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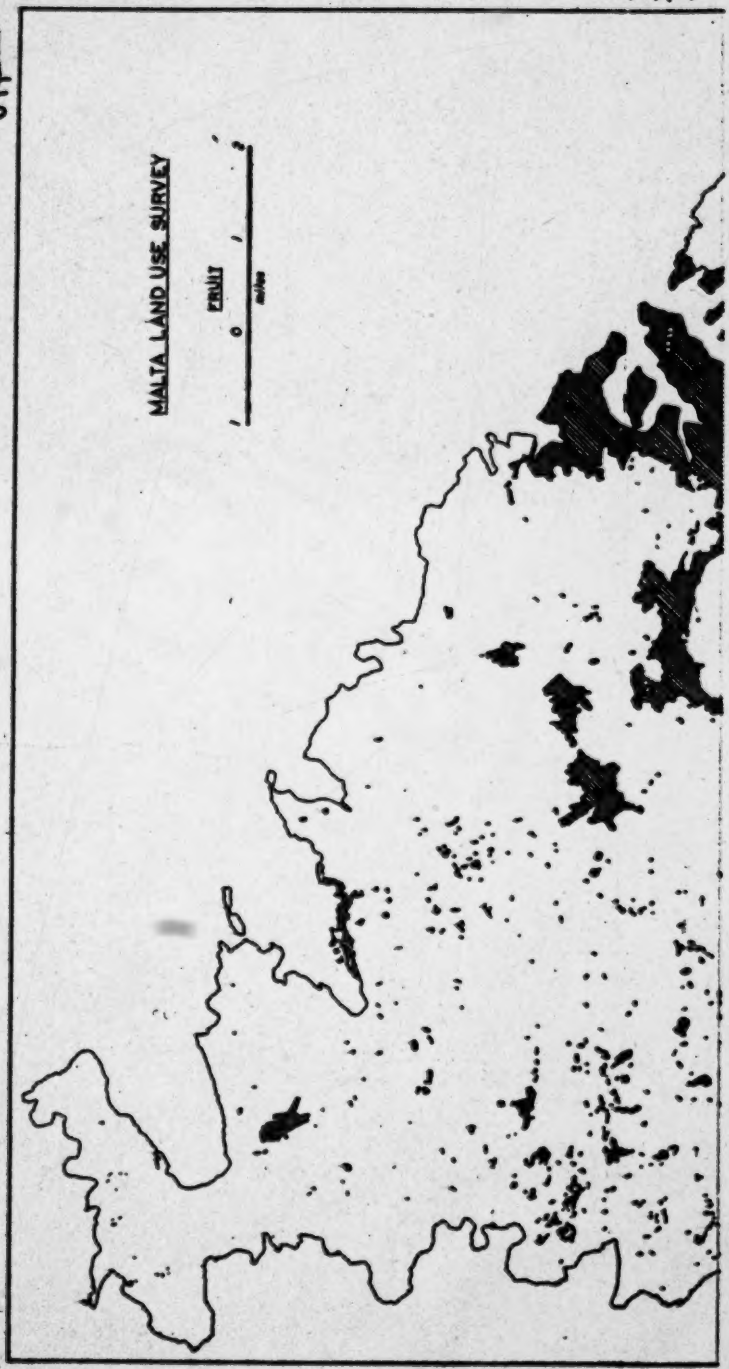

[p. 214-A]

Fig. 83 Malta: Land Use Survey: Fruit.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Malta

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Fig. 83
Malta: Land Use Survey: Fruit.

[p. 214-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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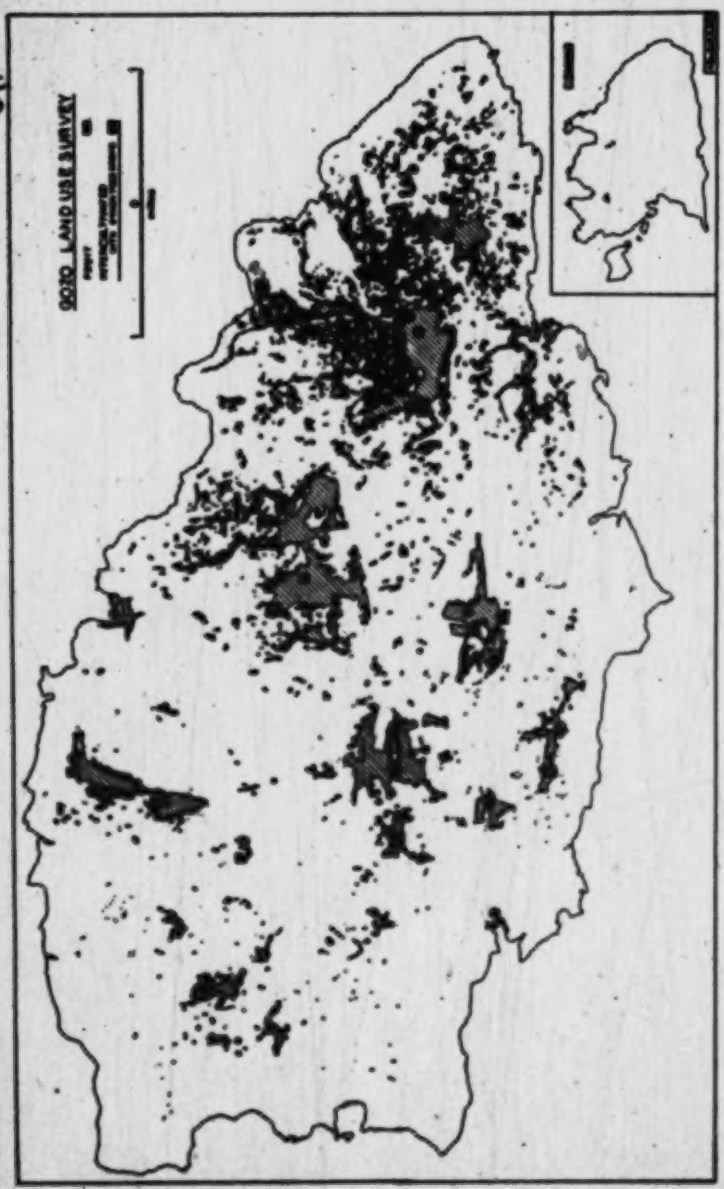

Fig. 84 Gozo: Land Use Survey: Prelt.

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[p. 216-A]

Fig. 85 Malta: Land Use Survey: Tomatoes, Marrows, etc.

EZ6 Malta EZ6
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Fig. 85 Malta: Land Use Survey: Tomatoes, Marrows, etc.

[p. 216-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

been used as stock on to which lemons and sweet oranges have been grafted. Too great a variety of strains is cultivated, and too little grading is done to make citrus growing under difficult conditions a commercial proposition except in the home market. 311* 245

STONE FRUITS

Peaches and plums are found as wall-side crops in many areas. Irrigation improves their yields less than those of most other fruits and, since the water needs of the peach in particular are fairly low and soils generally suitable, commercial production for export to Northern Europe is at least a possibility.

POME FRUITS

Apples and pears are the only important members of this group. Apart from the *Bombinelli*, the small hard pears, efficient production implies the use of irrigation water by which means yields can be doubled or trebled. Production, at present sufficient for the home market, could be expanded. However, since handling and transport of these fruit is comparatively expensive and the complex organisation of European supplies is already established, better marketing facilities as well as an improvement in the quality of the crop would be required before any export sale could be established.

OTHER FRUITS AND NUTS

These range from pomegranates, grown, for example, as windbreaks in the Wied tal-Pwales, to loquats, which need irrigation, and almonds which, grafted on to wild peaches are prolific and hardy. Strawberries are grown on a limited scale in some of the irrigated areas. All these varieties, though distinguished in the original survey, are undifferentiated in Figs. 83 and 84. The distribution is clearly related to spring lines, Blue Clay outcrops and irrigated districts, and regional variations in the character of fruit farming are brought out in Chapter VIII.

FIG, CAROB AND PRICKLY PEAR

Fig trees are found for the most part along field edges and around farm-houses. Only in very rare instances do they occur in plantations though they are at times found growing in groves of mixed fruit trees. Of some importance domestically and in rural areas, the fig occupies an ecological position midway between that of the other fruits on the one hand and the prickly pear on the other. Physiologically well suited to dry soil conditions, fig trees require more shelter than the prickly pear and are less profitable on good land than are the stone fruits.

Prickly pear, of which only the spineless variety is grown, gives a poor fruit and serves as a reserve fodder. The young leaves are fed, chopped, to livestock when other fodder is in short supply. The nutrition provided is small but the water content is high. This plant is characteristically found on village and casal outskirts and in Malta it disappears in open country. In Gozo, where the leaves are often used to shelter growing vegetable plants, it is more widespread. Essentially a mark of primitive parochialism, the prickly pear sometimes occupies an unnecessarily large area of land and might occasionally be replaced by such plants as the sunflower, whose fodder value is much higher. A topic urgently in need of investigation is that of water extraction from neighbouring fields by wall crops of this kind. 311* 245 246

The carob is the tree of rough land and is rarely found on level areas, whatever their altitude. It has often been planted as much to disintegrate rock and boulders as to supply fodder. The beans have a very high fat and protein content but require feeding in moderation. Most of the large clumps in which this tree typically occurs are neglected and untended and are less productive than they could be. The import of carob beans into Malta would be appreciably reduced by more attention to the native trees. Under present conditions the carob is the only wasteland tree crop and its presence elsewhere denotes under-utilisation of better land.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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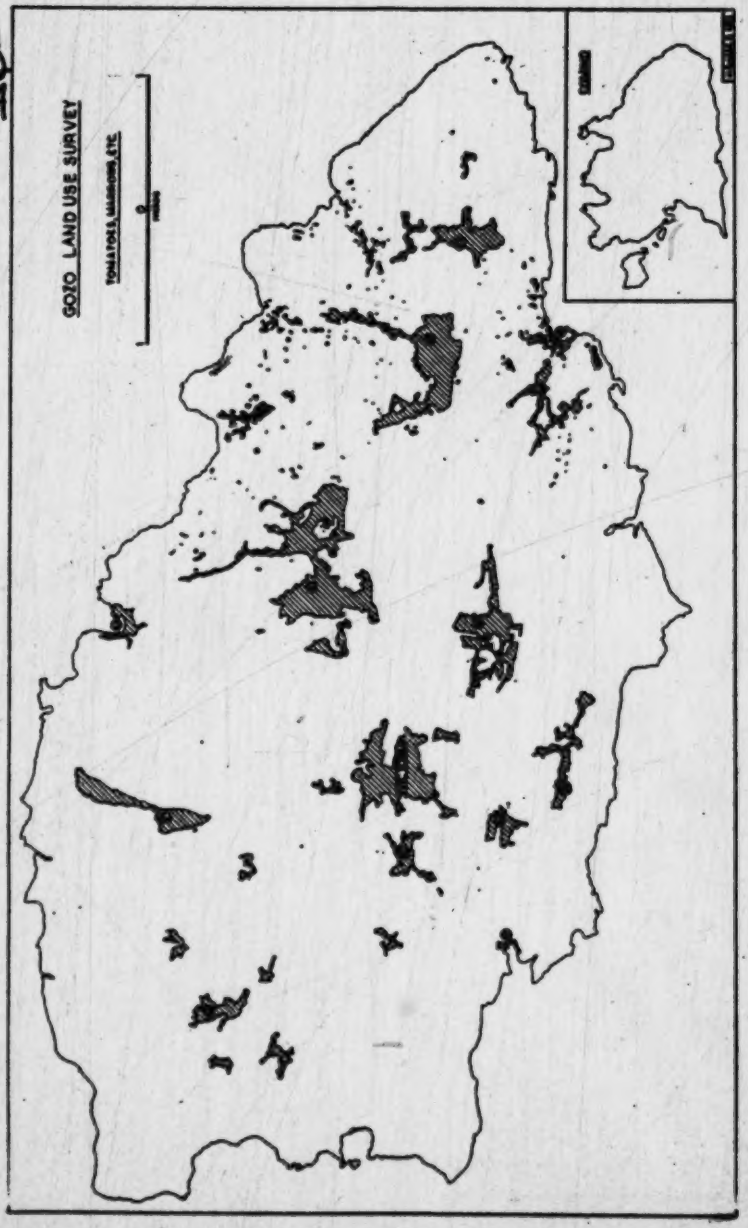

Fig. 68 Gozo: Land Use Survey; Tomatoes, Marrows, etc.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

VEGETABLES - TOMATOES AND CUCURBITS

The survey period, as noted previously, was largely confined to the spring season and thus coincided only with the earliest field plantings of these crops. Later in the agricultural year, the areas involved become more extensive (see below: Tilled Land), but the distributions here noted are indicative of special conditions for cultivation.

The distribution of these crops in Malta is shown in Fig. 85. Since 1957, the growing of tomatoes under glass has received official encouragement, but production by this means is as yet on a small scale and was previously all but non-existent. The planting of field tomatoes appears to take place later than climatic conditions make necessary and the harvest misses the main early markets in Europe. Export potentialities require further consideration as does the possibility of extending the areas of production. A small acreage of early tomatoes is planted out on non-irrigated land but the main districts correspond closely to the irrigation areas of the north and west. Particularly important is the Wied tal-Pwales, wherein there exist minor regional concentrations (see Chapter VIII). Other, smaller areas are found in the Marfa oases, Mellieħa isthmus and the Wied il-Ghasel.

During the survey period, the cucurbits are represented mainly by the dry-land gourds *qaraġ baghli*, which are particularly associated with the Żabbar district. This regional specialisation is at the moment not fully explicable but is of some traditional standing. Water-melons, pumpkins, etc., are found in the irrigated zones, for example in the Wied tal-Pwales and near Mellieħa. In other regions, such as that around Mġarr, the seed is usually sown about the end of April. Such plots have been omitted from the distribution maps because of the critical time variation from year to year. Here, as elsewhere, much depends on the rotation and the availability of ground water.

In Gozo (Fig. 86) during March and April, tomatoes predominate over the other crops of this group. Wieds Ramla, San Blas and Daħlet Qorrot are the main areas of cultivation, mainly as the result of shelter and the availability of water from the mesa spring-lines. In Wied Ramla (see Chapter VIII) there is a special association with the warm, sandy soils of the eastern slopes. These crops are also of some importance around Mġarr and Għajnsielem, associated partly with special soil conditions but also with nearness to the harbour from which they are shipped to Malta.

ONIONS (*Basal*) (Figs. 87 and 88)

These are grown on the better dry soils as well as in irrigated areas. They have been distinguished from other vegetables because of their traditional and potential status as an export crop. Most holdings have an onion patch to supply domestic needs, but there is also a growing, though fluctuating export trade. The dark-skinned 'red' Spanish types are most suitable for Maltese climatic conditions and are also most in demand in overseas markets. This to some extent conflicts with the domestic demand for the flat, white types which do not store well.

In Malta, onions of all varieties are cultivated in small plots throughout the Globigerina lands. A belt of rather higher density stretches through the Central Region, extending from Attard to Qrendi. The Siġġiewi district is of especial importance, since here alone are grown considerable numbers of the red-skinned variety most suitable for export. A rather strange concentration is also found on the steep, terraced slopes of l-Imtaħleb.

In Gozo, onion cultivation is general around the villages. The only significant regional concentration is that on the southern flank of the Xewkija Ridge.

OTHER VEGETABLES

During March and April, field vegetables are confined to crops such as artichokes, particularly grown for Lenten consumption, early or seeding brassicas, garden crops including phaseolus beans and lettuce together with minor root vegetables such as carrot and kohl rabi.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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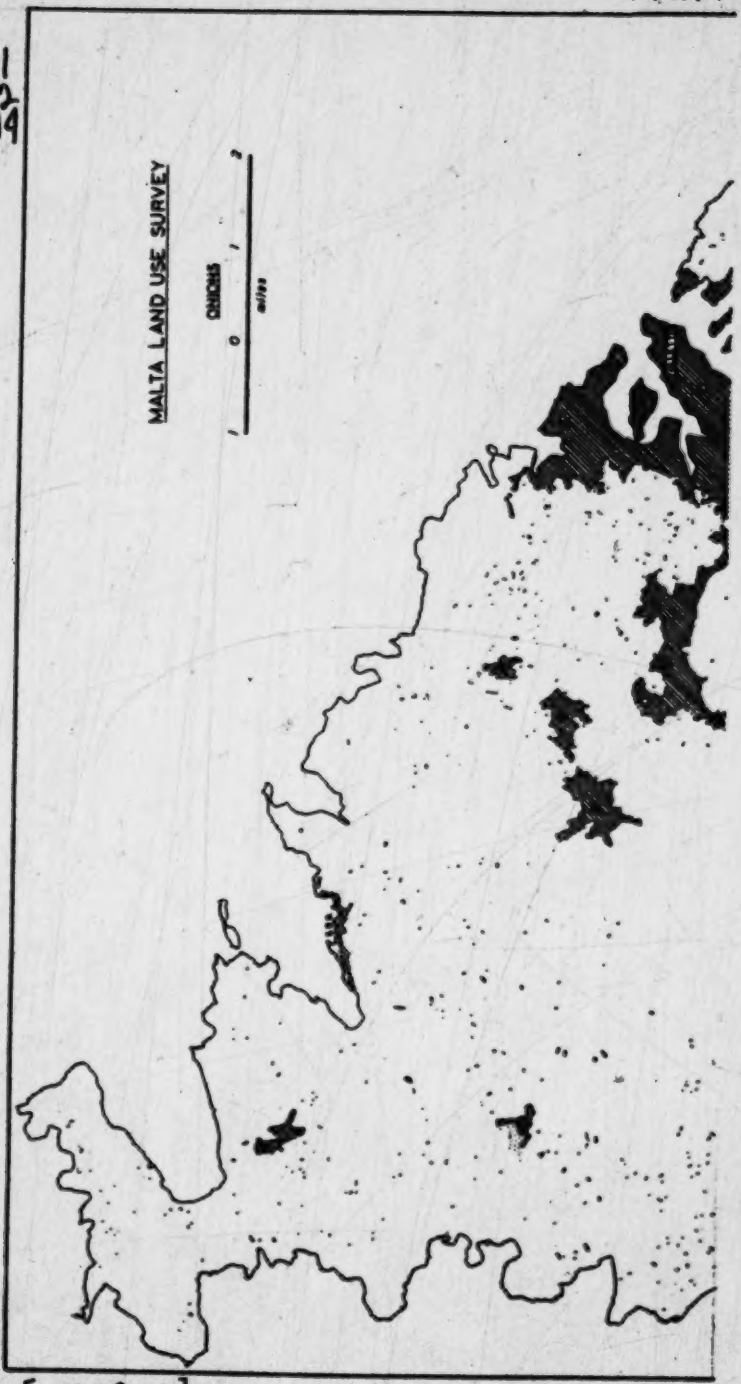

[p. 220-A]

Fig. 87 Malta: Land Use Survey: Onions.

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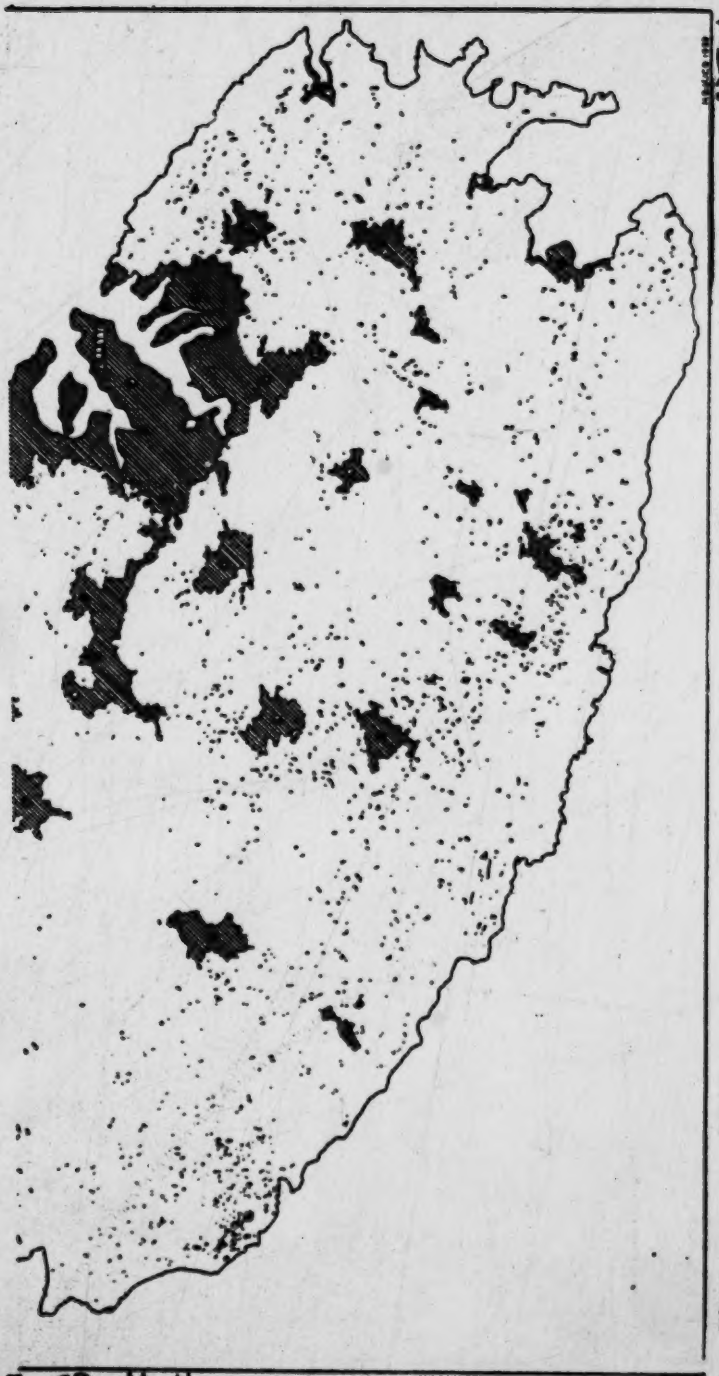

Fig. 87 Malta:
Land Use Survey: Onions.

[p. 220-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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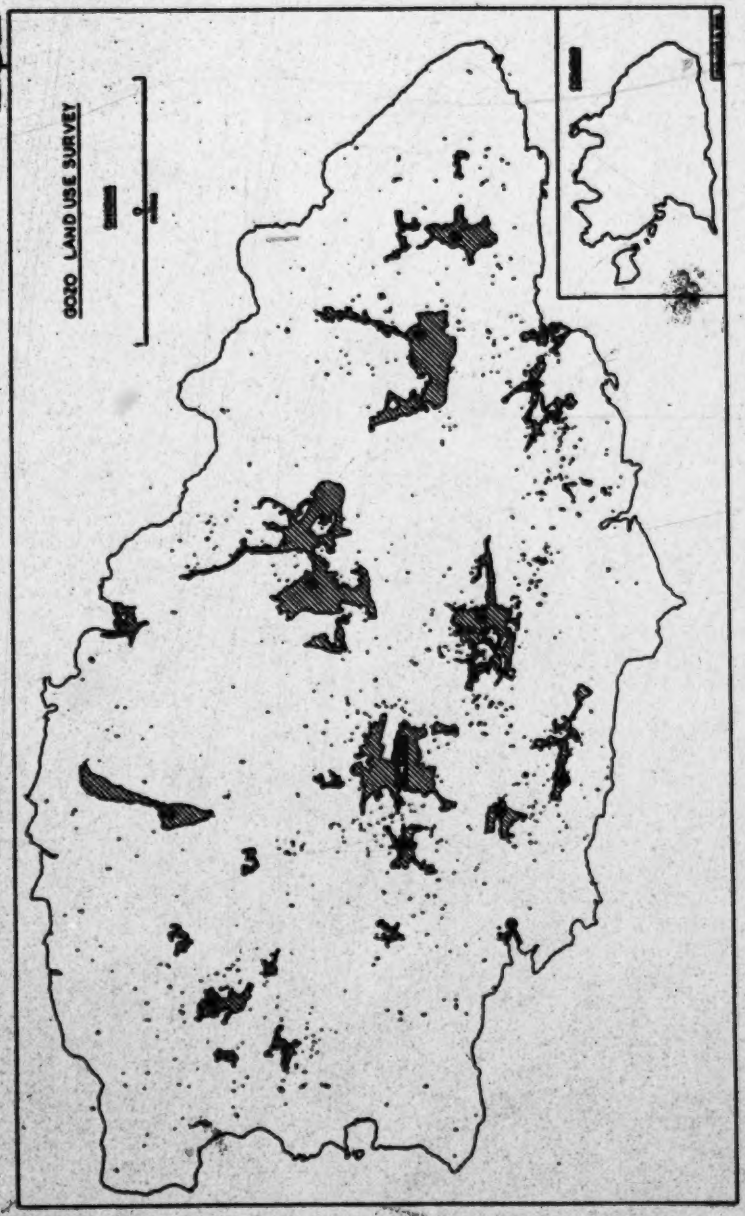

Fig. 88 Gozo: Land Use Survey: Onions.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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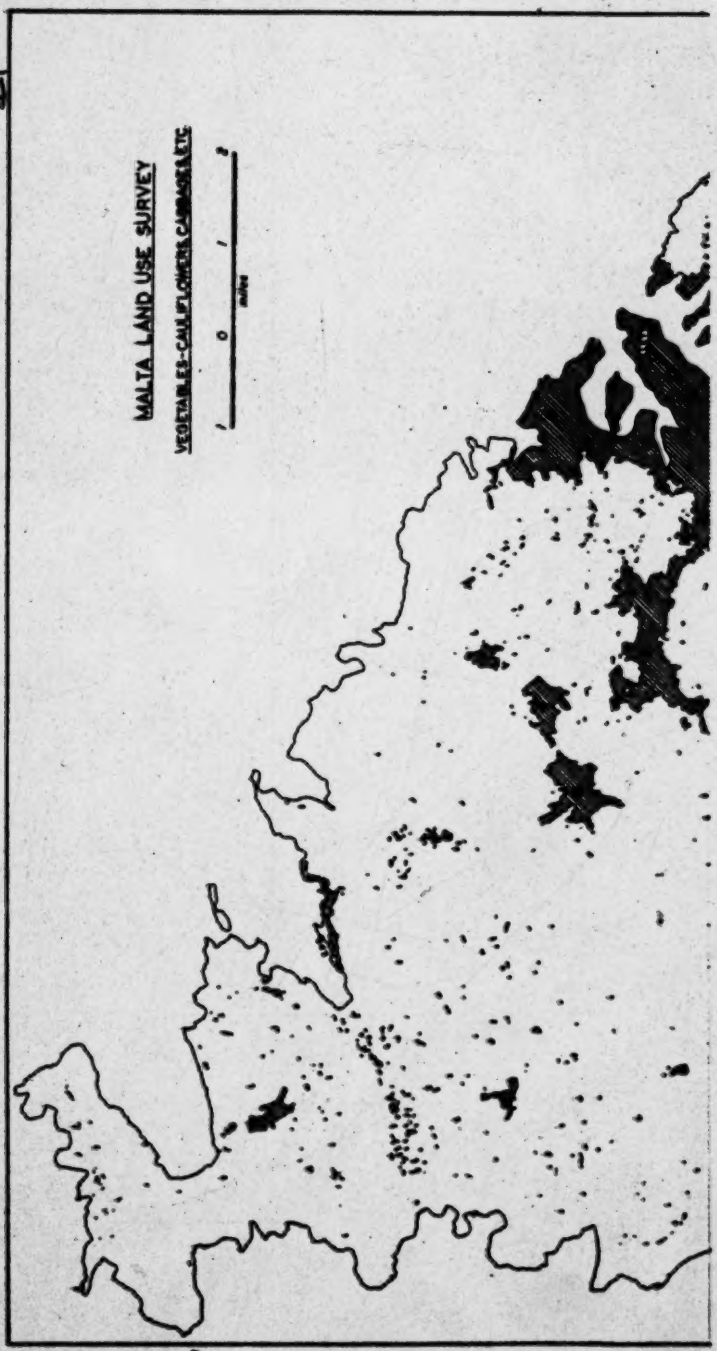

[p. 222-A]

Fig. 89 Malta: Land Use Survey; vegetables.

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Fig. 89 Malta:
Land Use Survey: Vegetables.

[p.222-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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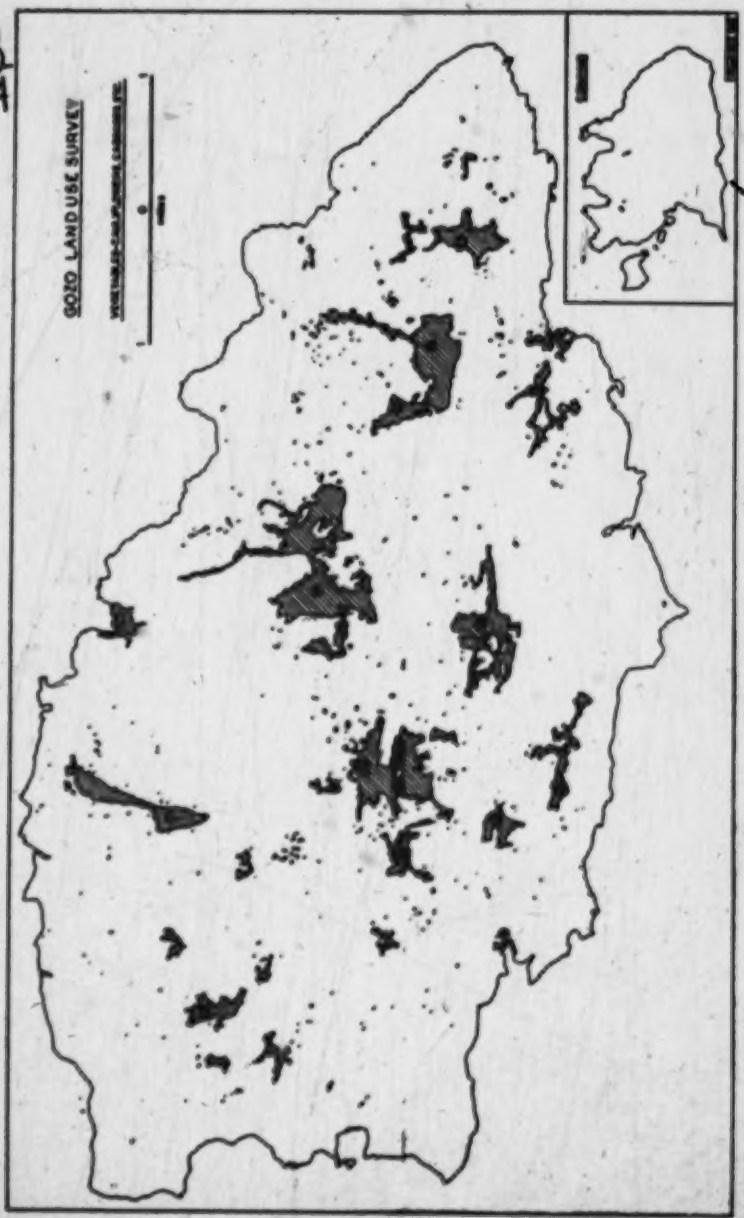

Fig. 50 Gozo: Land Use Survey: Vegetables.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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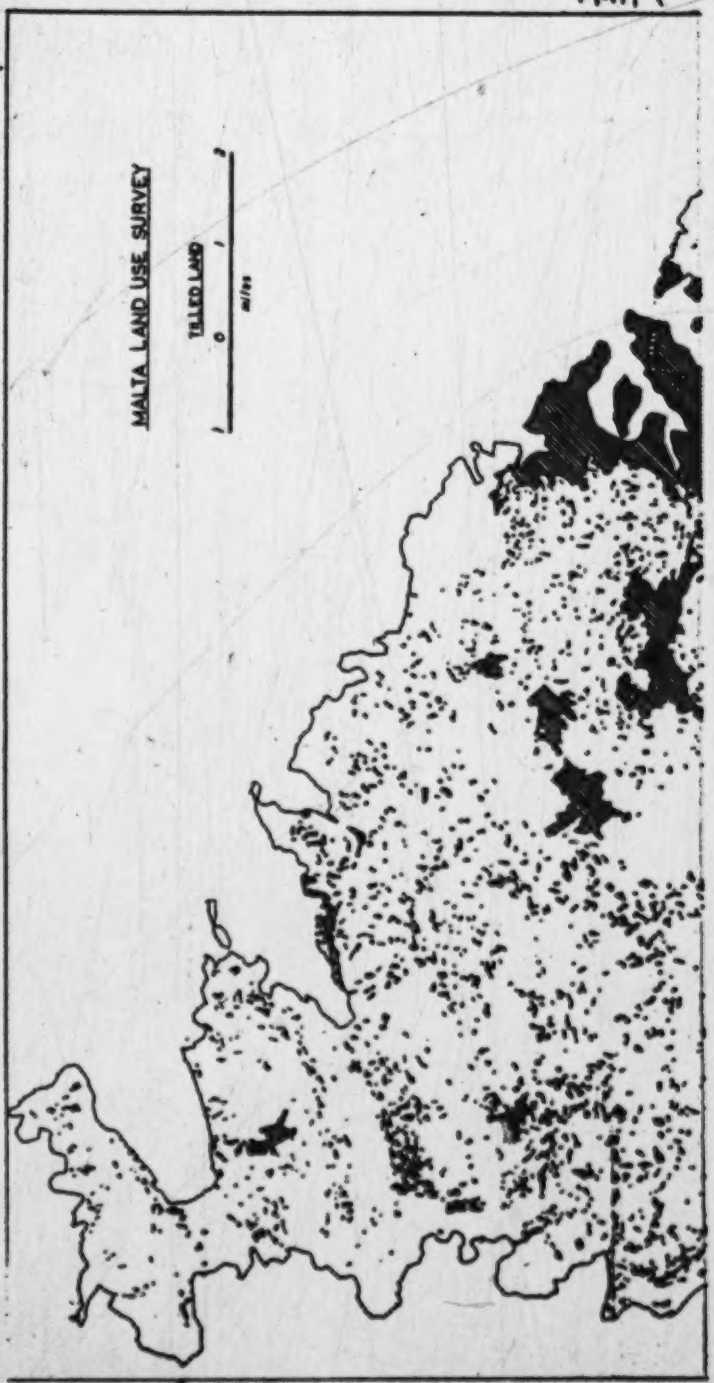

[p. 224-A]

Fig. 81 Malta: Land Use Survey: Tilled Land.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

EZ6 Malta EZ6
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Fig. 91 Malta;
Land Use Survey: Tilled Land.

[p. 224-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

Various types of location may be observed. In Malta (Fig. 89) there are, first, the main irrigated vegetable zones of the Wied tal-Pwales and Wied tal-Mistra where cultivation is carried out on a commercial scale. A great variety of crops are raised, but artichokes assume a particular importance. Secondly, in the Bur Marrad district of the Wied il-Ghasel, there is considerable specialisation, particularly in artichokes and to a lesser extent in brassicas. Thirdly, there is the group of districts around certain settlements with urban-fringe market gardening. Near Żabbar, mixed vegetables, predominantly brassicas, are cultivated in many small plots, often worked by part-time farmers. Around Qormi, the possibility of irrigation has encouraged a very considerable spread of market gardening which further extends into Hamrun. Near Rabat, a similar, smaller zone is also of some importance for mainly non-brassica crops.

Lastly, a belt of vegetable cultivation occurs on the high central platforms between Żebbug-Siġġiewi and the Rabat-Dingli upland. In Fig. 89 the importance of this zone is not fully illustrated. Fig. 91, showing tilled land during the survey period, gives an indication of the considerable area which is, later in each year, devoted to summer vegetables. This is pre-eminently the area of brassica cultivation with cauliflowers of particular importance. The reasons for this are not completely known, but seem in the main to reflect climatic and soil advantages (see Chapter VIII).

In Gozo (Fig. 90) the range of vegetables grown is rather smaller than in Malta, and cultivation is much more closely confined to the settlement fringes. There are some exceptional districts, such as the Wied tal-Mistra in the north-east and the small depression lying north-west of Victoria, where good supplies of water have encouraged commercial specialisation.

TILLED LAND (Figs. 91 and 92)

Land shown in this category is that which either had a prepared tilth in readiness for further sowing and planting or had been cleared for summer fallow. This would follow early harvesting of sulla, *ferrasa* and potatoes or a long fallow period. Areas where tree-crop cultivation is widespread are obviously of little significance in this category. Classification problems arise in that cleared land unsuitable for summer cultivation (for reasons of environment or rotation) is, under Maltese conditions, difficult to distinguish from land about to be planted. However, it can be stated with some degree of certainty that in Malta the main belt of tilled land west of Siġġiewi and Żebbuġ represents land prepared for summer vegetable cultivation (see Chapter VIII). In Gozo, much of the tilled land of the west is prepared in readiness for summer cotton growing.

COTTON (Qoton)

The cultivation of cotton, which was widespread in the Maltese Islands from Classical times to the mid-nineteenth century, has been slowly reviving in Gozo during the last few years.

This is only the annual crop of which the seasonal range fell completely outside the survey period. Cultivation is most considerable around Żebbuġ, Għarb and San Lawrenz. Environmental conditions are far from optimum and the future of cotton growing depends largely on the efforts and interest of one textile firm and of the Government.

FALLOW LAND - Malta (Fig. 93)

Land classified under this head is that which neither carried a crop nor had a prepared tilth but which did not appear to have been unworked for more than about a year. Some such land is inevitably in the first stage of abandonment, but other areas have remained uncultivated for a variety of other reasons connected with quarrying, tenurial disputes, demands of the Defence Departments and various types of farming hazard.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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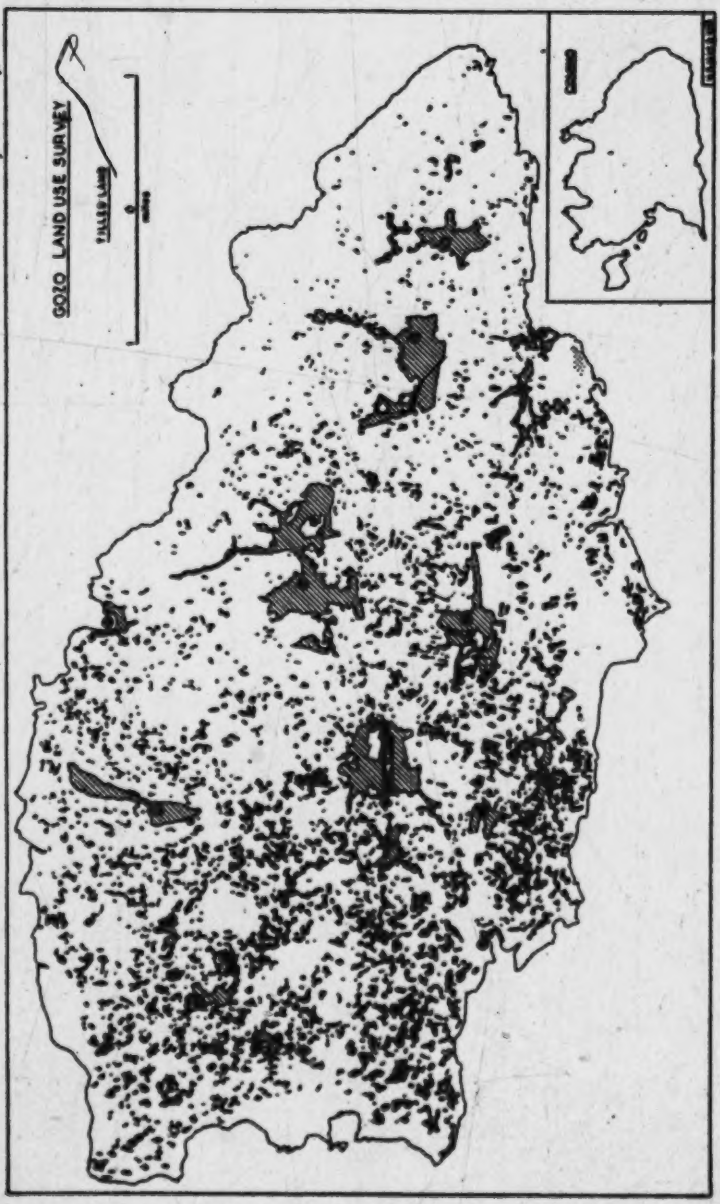

Fig. 61 Gozo: Land Use Survey: Tilled Land.

FALLOW AND ROUGH GRAZING - Gozo (Fig. 94)

As noted above, land classification in Gozo presents special problems. The widespread occurrence of self-seeded sulla, very often heavily weed-infested, and abandoned land still carrying (on the thicker soils) fairly dense herbaceous and graminaceous vegetation, is not an indication of completely waste land. This intermediate category is a reflection of the lesser intensity of direct pressure on agricultural resources and the greater importance of field grazing in Gozo.

WASTELAND

All areas in which a soil mantle has never been developed or from which it has been wholly or partially removed by erosion, together with land which has obviously not been cultivated for some years, have been classified as waste. Thus, karstland as on the Marfa Ridge, the clay badlands of Ghajn Tuffieha, the abandoned terraces of Wied il-Kbir and the more recently neglected fields of il-Wiggia in Wied tal-Pwales, all fall within this category. Earlier classifications of wasteland in the Islands have attempted to postulate completely unutilised barrenness. This, on the one hand, leads to an underestimate of the extent and rate of abandonment, a feature of crucial importance, and on the other over-estimates the absence of value: much wasteland is in fact utilised for *xagħra* grazing.

Figs. 95[2] and 96[2] indicate the magnitude of wasteland in the Maltese Islands. Gradient as such has little effect, parent rock, water supply, accessibility and exposure all being a good deal more important. The Lower Coralline exposures are very largely waste, a result of the slow rate of physico-chemical disintegration of this massive series. The other major wasteland areas are associated with special conditions of aspect and altitude. The fact that they are largely developed on Upper Coralline rocks results not from any parent-rock intractability but from the great height at which the strata of this series generally lie and from shortage of water. As noted in Chapter III, Terra Rossa development can give very productive areas.

In Malta, the inter-relationship of aspect, topography, geology and soils is well exemplified in the northern part of the island. The structural and topographic grain is transverse to winds blowing from directions between north and west. As noted in Chapter II, these winds bring high humidity and low temperatures, during the winter season. Ecological conditions of relative bleakness inhibit vegetal growth and soil formation except in sheltered depressions. The effect on land use has been to bring the 'karst line' down to sea level on the exposed Marfa peninsula, from which it ascends south-eastwards towards the more sheltered interior ridges. The level of cultivation rises progressively higher until, on the Santi-Binġemma plateau, it extends over the whole upland area. Secondary controls are exerted by details of aspect, altitude and spring-line development. Thus Bajda Ridge, of intermediate height and lying in the lee of Mellieħa Ridge, forms one of the most continuous belts of wasteland. Structurally an anticline, and too small to contain an appreciable body of water or to allow doline formation, the Bajda Ridge is unlikely ever to allow a more intensive form of land use than that provided by the experiments in afforestation now in progress.

Comino and Cominotto, which are fragments of a shattered Upper Coralline anticline, are almost entirely waste. A few patches of cultivation in sheltered positions are all that remain of a never very extensive tilled area. Remoteness and exposure are sufficient to explain the present condition of these small islands.

Dissection and consequent exposure of the Lower Coralline have been the major processes giving rise to wasteland in Gozo. This is clearly exemplified in the fault-shattered zone of Qawra, id-Dwejra and the Wied Ilma as well as in Wied iz-Żebbuġ. Along the north coast, steep cliffs fall to a Lower Coralline platform which is reflected in an analogous belt of wasteland, while the barren ta'Cenċ hills are also developed on rocks of this series. In the north-east, wasteland covers the higher and more exposed *qortin* areas and scattered stretches of waste occupy much of the steep and tectonically disrupted eastern

[See pp. 230 A & B and 231 -- Analyst)
[TEXT CONTINUES ON P. 233]

1: Bowen-Jones et al. K-6 (1956-1958) 1961
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[p. 228-A]

Fig. 93 Malta: Land Use.

1: Bowen-Jones et al. K-5 (1956-1958) 1961

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Fig. 93 Malta:
Land Use Survey: Fallow.

[p. 228-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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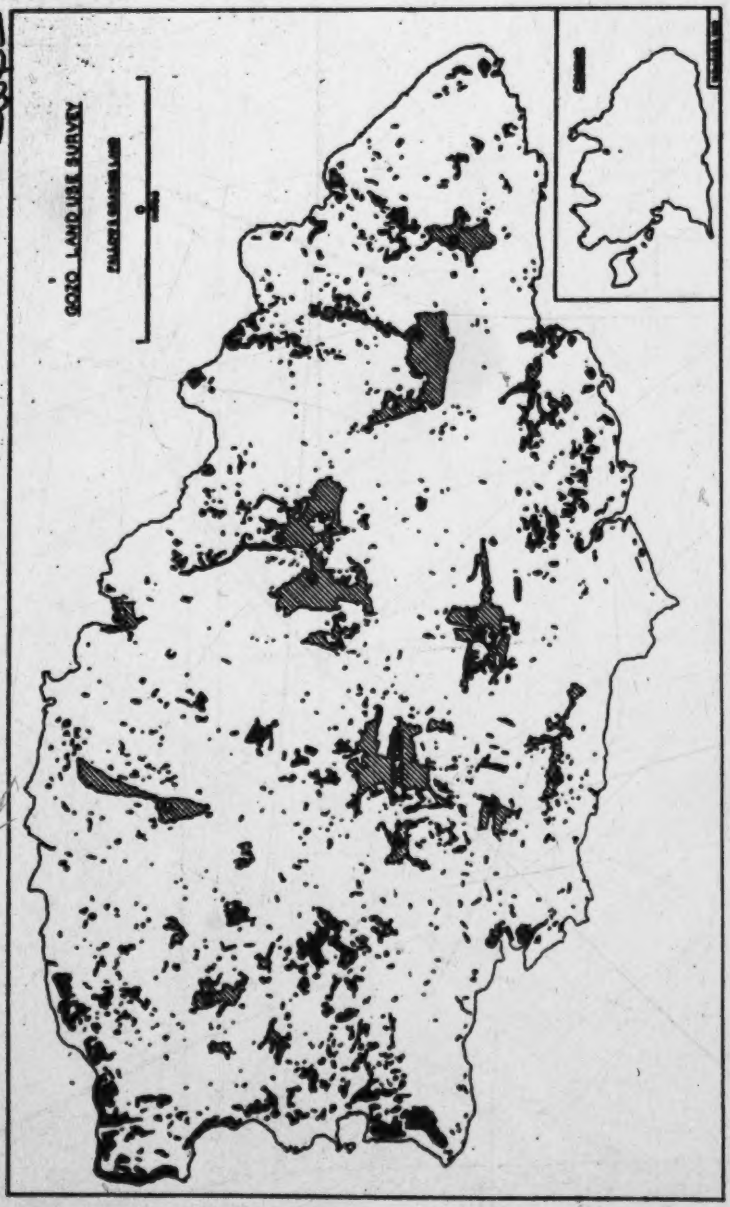

Fig. 84 Gozo: Land Use Survey: Fallow and Grazing.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Fig. 86 Malta: Land Use Survey;

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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Fig. 95
Malta: Land Use Survey: Wasteland

[p. 230-B]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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Fig. 88 Gozo: Land Use Survey: Wasteland.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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[p 232-A]

Fig. 87 Malta: Land Use Survey: Non-Agricultural Use.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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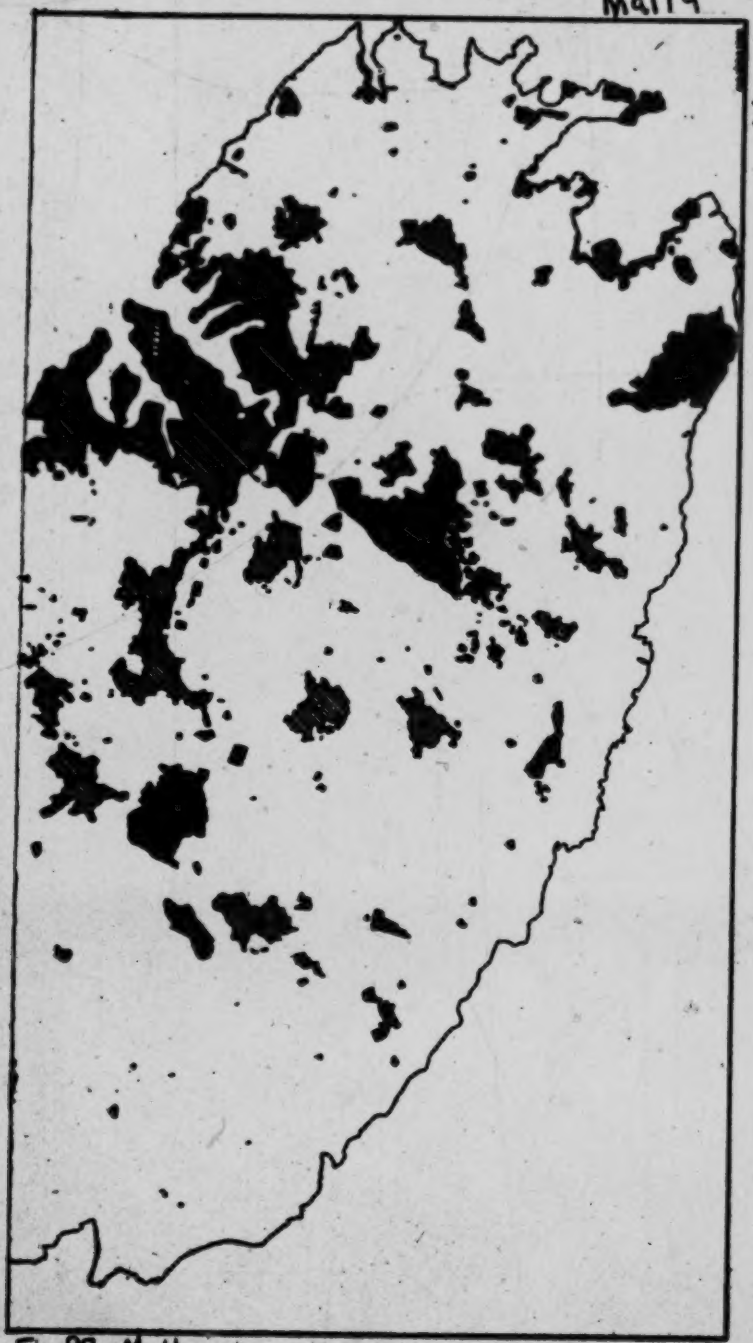

Fig. 97 Malta:
Land Use Survey: Non-agricultural Use.

[p. 232-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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slopes. With the exception of ta'Ċenċ, these areas also correspond to the most remote and difficult lands. Lastly, the tops of the smaller mesas, too restricted in area for permanent settlement, form lesser patches of waste.

NON-AGRICULTURAL USE (Figs. 97 and 98)

This category covers a variety of uses of land. The major element here is land occupied by settlements. In Malta, this includes true urban development as in the Valletta conurbation, agro-towns (the *casals*) and a small number of village-hamlets such as Mġarr and Bubaqra. Their limits, plotted on a six-inch scale, were drawn to separate true farmland from house-gardens, orchards and stockyards associated with the settlements. As noted previously, this has resulted in some slight exaggeration of the areas defined as 'built-up'.

In Gozo, Victoria is the only true town. Żebbuġ, Xagħra, Nadur and Qala have small urban nuclei but otherwise consist of agglomerated farmsteads as also do the remaining villages. Field-work on a 25-inch scale has allowed a more precise delineation of the built-up areas and of dispersed settlement. The latter, as may be seen from the maps, bears a striking correspondence to the road pattern.

The 'Miscellaneous' category includes land used by the Defence Departments as airfields, barracks and other installations. For security reasons, a more detailed appraisal has not been made. Other types of land-use included here are quarries being worked at the time of the survey, as in the Naxxar-Gharghur and ta'Kandja districts of Malta, sportsgrounds (e.g. Marsa) and reservoirs as at ta'Ċenċ. In Malta, small groups of buildings outside the main settlements also fall within this category, whereas in Gozo only special cases such as that of ta'Pinu shrine and the Fort Chambray asylum are so marked.

The 15 different types of land use portrayed in the distribution maps are a striking illustration of the wide range of conditions, physical, human and economic, to be found within the Maltese Islands. A fuller picture emerges when the regional combinations of these elements are studied in detail and this is done in Chapter VIII, where different crop assemblages are used to define Agricultural Regions.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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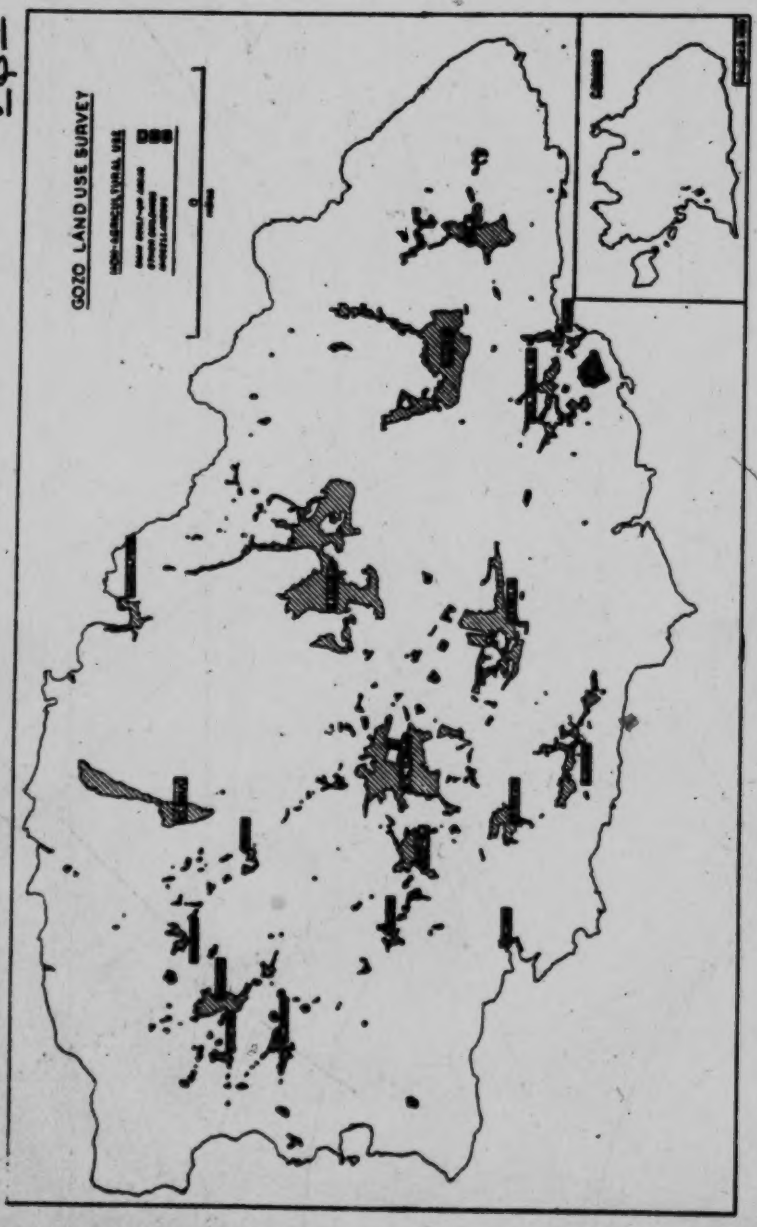

Fig. 93 Gozo: Land Use Survey: Non-Agricultural Use.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Chapter VIII

AGRICULTURAL REGIONS

Individual crop distributions have been considered in the preceding chapter but in order to understand the nature of Maltese agriculture, more complex analyses of spatial differentiation must be made. The method adopted is to identify areas characterised by particular crop assemblages and thus to define agricultural regions. 241* 31*

Over the Islands as a whole may be observed a series of distinct farming landscapes which reflect a graduation in physical and socio-economic conditions. The lowest grade of land use is represented by marginal production of the hardiest fodders and legumes. Vetches and poor barley are cultivated in small pockets of soil lying between expanses of bare karst. The regions in which this pattern is dominant, being primarily used as rough grazing land, are most suitably referred to as *xagħra*. Extensive dry farming covers much of the Islands, varying in quality particularly with variations in exposure, slope and water supply. The poorest type is restricted to low-grade cereals, sulla and the minor fodders and legumes. A medium grade of dry farming, occurring where conditions are more favourable, is characterised by crops of better quality and higher value. Potatoes become prominent and specialised production of certain vegetables such as *qarraġ ħaġli* appears. On well watered but non-irrigated land, the crop assemblage is further enlarged by the addition of vines on an appreciable scale. Vegetables now include both spring- and summer-grown, field and garden types, notably brassicas. Where irrigation is possible, higher-value vegetable crops such as tomatoes, melons and artichokes become widespread, although the potato is dominant. Small-scale cultivation of fruit and table-grapes is also of some importance. Finally, the *ġnien* and *rdum* lands, which are distinct although not everywhere the most intensively worked areas, are often characterised by much inter-cultivation and by the varying importance of all the high-value crops. It is here that fruit is most widely grown. These six types of crop assemblage are readily recognisable and provide the basic criteria for regional analysis of the rural landscapes of Malta and of Gozo. [233]

Malta

In Malta, there is a marked correspondence between the physiographic regions as described in Chapter II and the agricultural regions. A major threefold division may be observed in both cases:-

A. The Western Scarplands.
B. The Wied-il Ghasel District.
C. The Hills and Plains of the Centre and East.

A. THE WESTERN SCARPLANDS

The physical characteristics of this major region have been outlined in Chapter I and their effect on the distribution of waste and cultivated land noted in Chapter VII B. The south-west to north-east graining of the land is the predominant physical control, but secondary controls are exerted by details of aspect, altitude, soil and water supply, so that many local deviations from the general pattern of wasteland ridge and cultivated basin may be observed. General points concerning settlements include the tendency for these to develop at the junction of the two types of landscape, though there are important exceptions to this arrangement. The alignment of roads further affects the degree to which particular districts have been developed or neglected. The fact that road [191]

[Text continues on p. 238]

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1: Bowen-Jones et al. K-5 (1955-1956) 1961
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[p. 236-A]

Fig. 00 Malta: Agricultural Regions

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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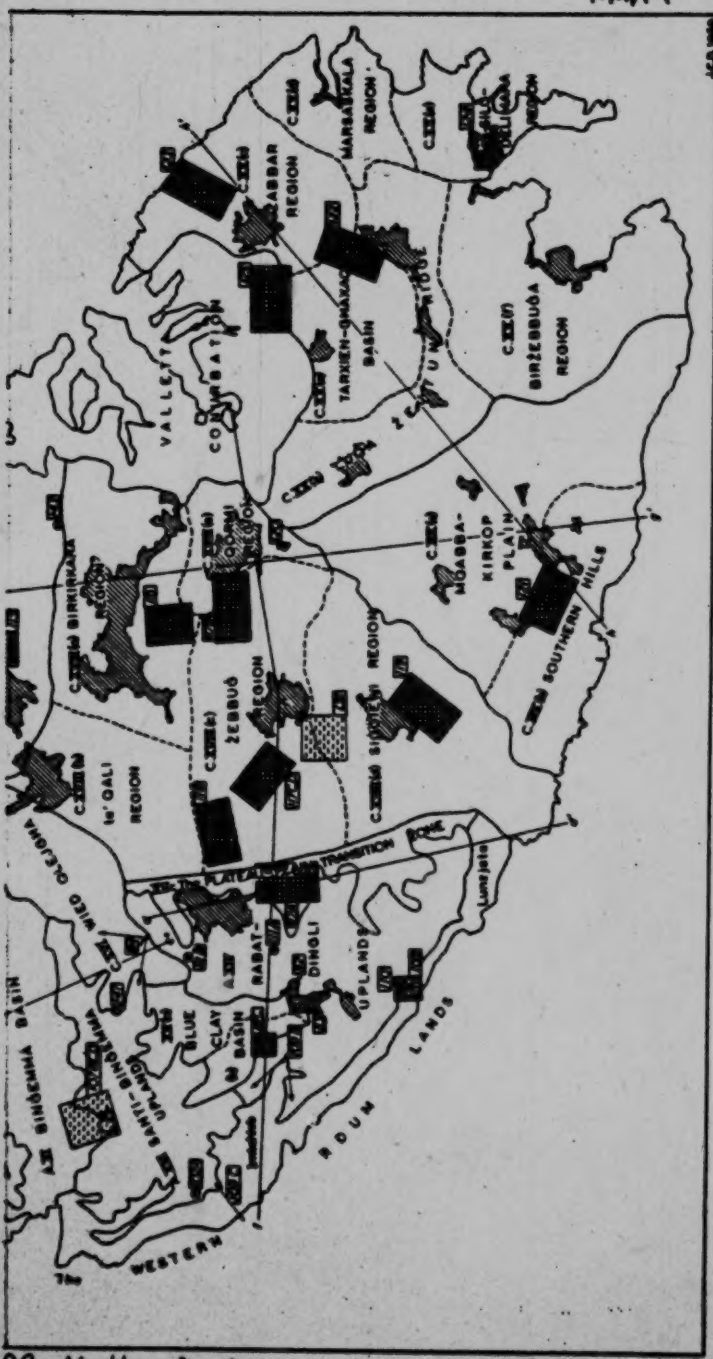

Fig. 99 Malta: Agricultural Regions and Key to Figures in Text.

[p. 236-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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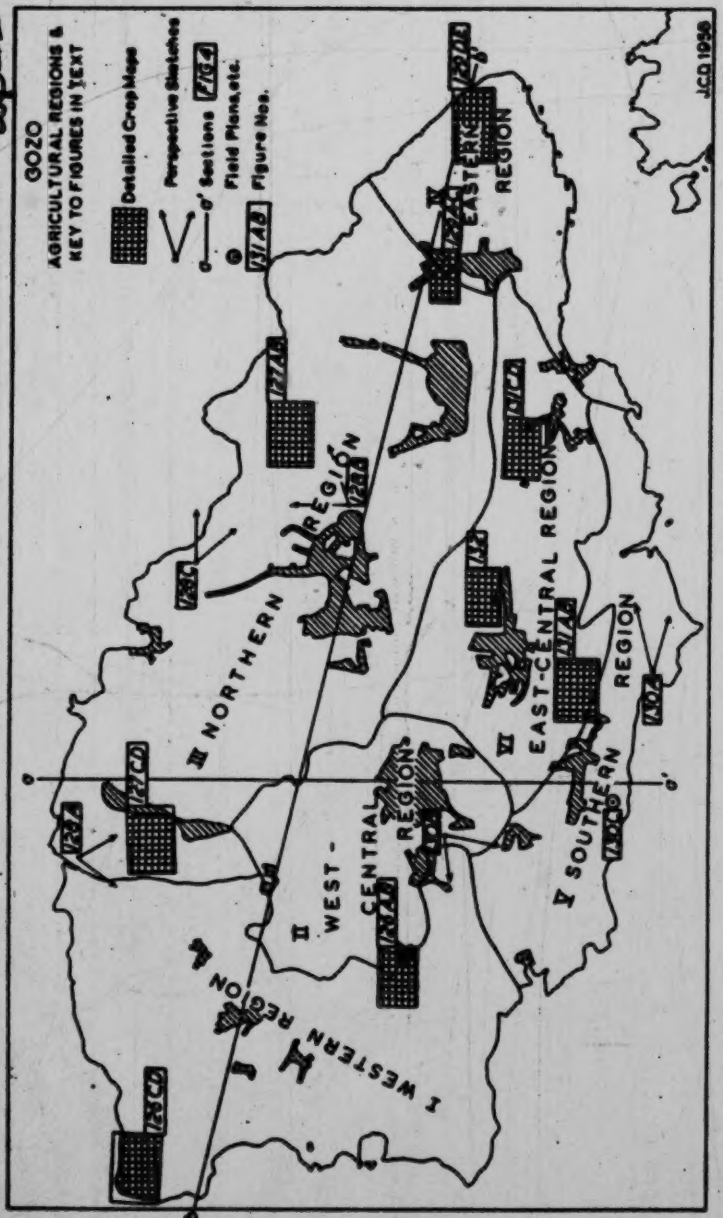

Fig. 100 Gozo: Agricultural Regions and Key to Figures in Text.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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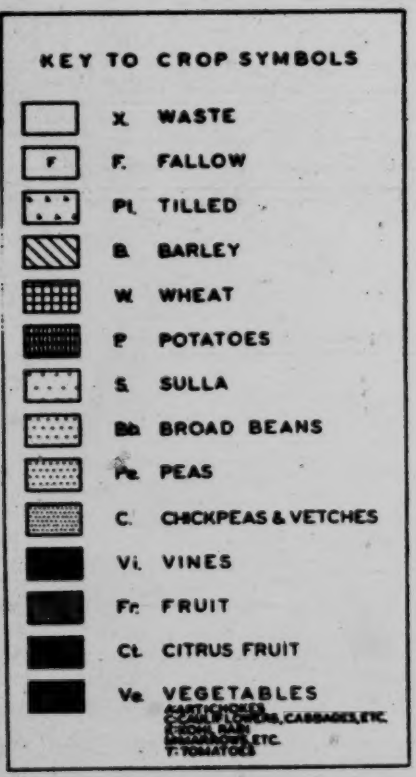

Fig. 101 Key to Crop Symbols as used in Figs. 102-132 inclusive.

[891] building has been influenced not only by the needs of the farming community but also by military and, more recently, by tourist requirements adds a further element to an already complicated pattern. Isolation is a social and economic matter as well as a physical one. For all these reasons, detailed regional study is necessary before the full range of conditions present in this region can be appreciated.

A point of particular application to the Scarplands is their economically marginal character. It is here that development and neglect, advance and withdrawal of the 'cultivation frontier' have been most effective, reflecting changes in the economic and social position of agriculture and the rural community. Thus published maps of this region show a rectilinear pattern of roads, tracks and field boundaries which takes no account of topography, contrasting with the older field pattern on which it is often superimposed. This palimpsest of economic change appears mainly on land once Government owned and is most extensive in Marfa, the northern flanks of Mellieha Ridge and on Bajda Ridge (Fig. 68).

A.1. MARFA

Much of the peninsula is now *xagħra* land although a larger area has been cultivated in the past. Poor dry farming persists in a few areas such ta'Ramal

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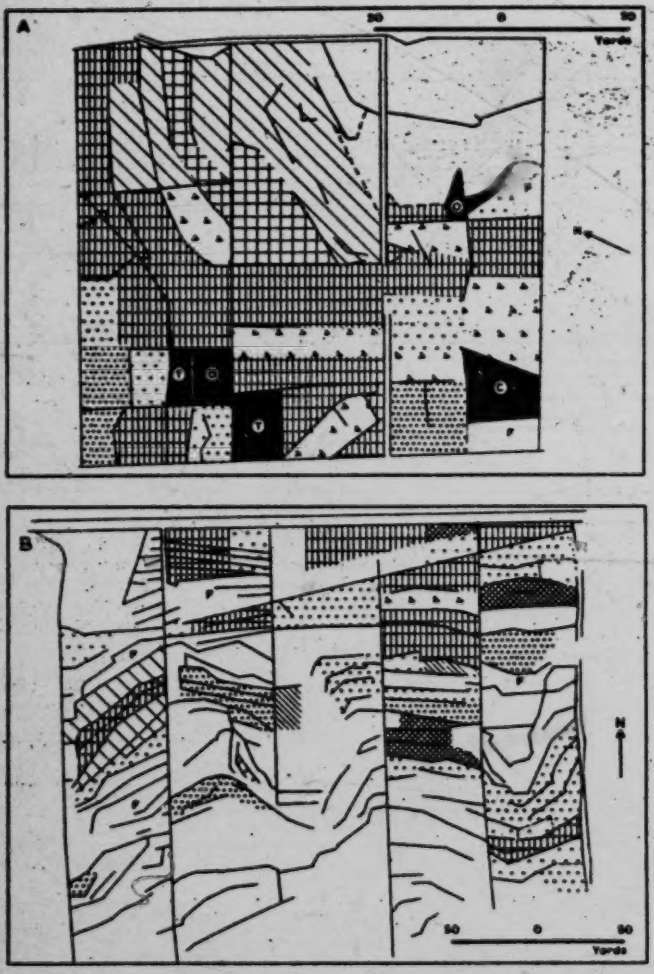

MALTA - WESTERN SCARPLANDS

Marfa Peninsula

CROP PATTERNS (SPRING)

A : ta'Macca (5) B : Ghajn Tuta (1) HBJ1958

Fig. 103 Malta: Western Scarplands: Marfa Peninsula.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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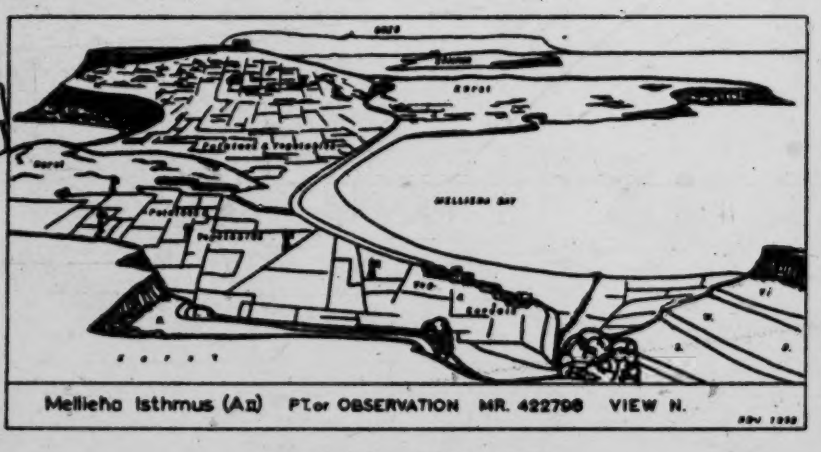

Fig. 103 Malta: Mellieha Isthmus.

(8)*, id-Dahar (Fig. 102 B) above the Wied Ghajn Tuta (1), and in smaller scattered plots. It also occurs in the undercliff zones of Rdum tal-Qammieh (9)* (significantly, 'Qammieh' means 'wheat-producing') and Rdum tal-Ahrax (10) where Blue Clay and Globigerina outcrop beneath the Upper Coralline scarp. A few small homesteads are sparsely scattered over these zones. In the small valleys which open to the north, such as Wied Musa (2) and ta'Maċċia (5) (Fig. 102 A), wind-pump irrigation and road development have allowed the introduction of commercial cultivation of potatoes and vegetables. Field boundaries have been recast, new farms built and cultivation extended on to former wasteland. The utilisation of these small oases is essentially precarious as sea-spray salinity on the one hand and ground-water salinity induced by over-pumping on the other set definite limits to productivity. Abandoned wind pumps mark points at which these limits have been over-stepped.

Thus in the region there occur simultaneously both slow abandonment of the harder lands and reclamation of especially favoured pockets.

A.II. MELLIEHA ISTHMUS (Fig. 103)

There are three separate areas of cultivation. Il-Ghadira (11) and il-Hofra (12), lying on either side of a barren karstic hill, are pump-irrigated for the production of potatoes and some summer vegetables. Good dry farming is represented by the marled slopes between Mellieha and the sea (13).

A.III. MELLIEHA RIDGE

Here, as in other, analagous regions, there is a natural association of central summit-lands with fringing valley embayments. In the west, rising in cliffs from the sea and more gently from the head of Mixieb, the ridge is almost entirely waste, although a few small plots of minor fodders and beans have survived abandonment. Near Mellieha, in contrast, small scale reclamation is extending an area of rather more intensive cultivation. This is associated with the rapid growth of Mellieha itself. Further to the east, topographic controls become dominant, cultivation, with one exception, being confined to the several depressions. Wied Imgiebah (19) is intensively cultivated in spring-watered high terraces near the cliffed coast. Further inland, where water is less plentiful,

*A number in brackets following a place name refers to Figs. 69 and 70.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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vines and potatoes become replaced by other field crops. A small cluster of large farmhouses lies on the lower, richer land. Above the head of the valley is the small but striking patch of cultivation at tal-Brag (18). Geometrically laid out in small enclosures more than 70 years ago, this area of stony Terra Rossa soils is characterised by poor, mixed crops. Abandoned plots and buildings are numerous. Tal-Lembi (20), though lying at a greater altitude and in an apparently more exposed position, forms a larger and more prosperous cultivated area. Cultivation has been maintained in solution hollows and on terraced fields and where abandonment has taken place some reclamation is now proceeding below the Hadid - tal-Blata fault-scarp. This small-scale revival of vegetable growing appears to be consequent upon the improvement, for defence purposes, of the only road. Tal-Blata (21) lies on the Clay and Globigerina slopes which run down to the sea opposite St. Paul's Island (Selmunett). Cereals and sulla, much of the latter self-seeded and weed-infested, mantle these slopes.

Below these three upland areas lies the considerable valley of tal-Mistra ('the hidden place'). On the low, flat floor of the wied there is intensive cultivation of potatoes and vegetables, artichokes being particularly important among the latter. In this sheltered and windless pocket, motor- and donkey-driven pumps supply abundant irrigation water from a small, fault-bounded sea-level water body. On the terraced slopes rising to the north, are fields of fodders, cereals and vines.

Lastly, included within the Mellieha Ridge region, are the embayments which fringe its northern scarped edge. Each of these has its own especial land-use characteristics. The westernmost (12) includes the mixed, rather low-grade cultivation of the Wied tal-Hanżira and the unusually specialised raising of potatoes at San Niklaw. Ġnien Ingraw (15) and Wied Mellieha (16) have the added diversity of fruit-growing, the latter area also possessing market gardens of vegetables. In Għajn Żejtuna (17), the largest of these embayments, vines, grown on the upper slopes, are added to the range of crops.

Here again, some points of general application may be noted. Irrigation, particularly as affected by the extent of spring-line development, together with access to settlements and/or communications, encourage the cultivation of spring potatoes above all other crops. In summer, vegetables replace the potato. Mellieha Ridge, like Marfa, is an area of simultaneous abandonment and reclamation. Here, too, the rectilinear pattern referred to in the introduction (p. 238) is particularly well developed in the Qasam Barrani district west of Mellieha. It is perhaps significant that this place-name could indicate a large estate laid out away from the village. (Qasam = estate; Barrani = foreign or outside.) Mellieha itself was, until the late nineteenth century, a small settlement, remote on its defensive site, and its rapid growth during the last 60 or 70 years has been associated with the increased importance of commercial farming in the north-west of Malta generally. The developments envisaged by the laying out of the Qasam Barrani fields have not, however, been realised.

A.IV. MIŻIEB

Miżieb, which in Maltese means a gutter or drain, is in the topographic sense the upper basin of the Wied tal-Mistra. Geologically and hydrologically, however, it is quite distinct, a fact which is reflected in its agriculture. Although now known to possess considerable resources of water at depth in synclinal aquifers (Chapter I B), this is an area of dry-farming. The shallow basin is given over almost entirely to cereals, sulla and vines, the last often being much neglected. There is only one small centre of permanent settlement and this occurs around an old wine factory.

A.V. BAJDA RIDGE

As noted in Chapter VII B, this ridge forms the most continuous belt of wasteland in the island of Malta. There are two patterns of enclosure fragmentarily discernible in this area. The older of these, conforming to topography and structural grain, is marked by low curved walls and a few scattered fields of transported soil carrying poor crops of barley and vetches (see p. 301). The

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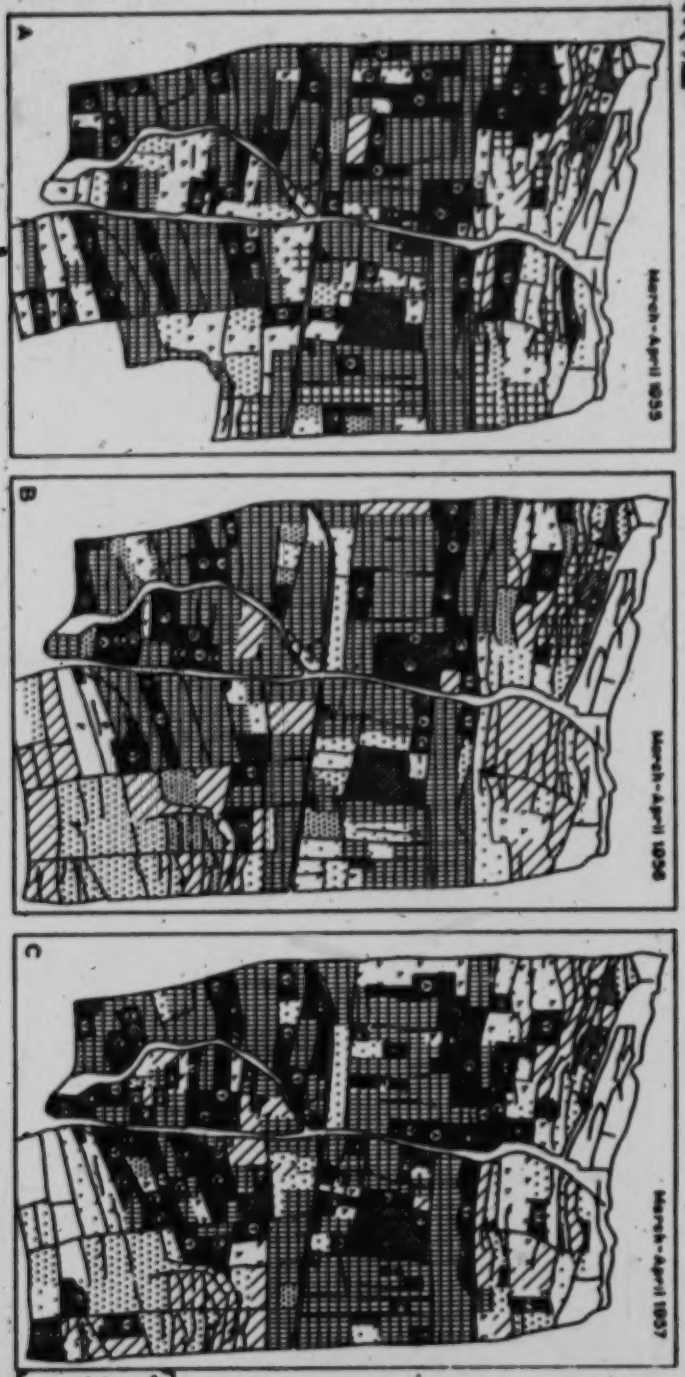

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[p.242-B]

Fig. 104 Malta: Wied tal-Pwales.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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newer pattern is represented by a rectilinear arrangement of tracks and a few walls. This apparent attempt to develop the region may be approximately dated to the 1880's, the last period of agricultural expansion. Very little of the land then laid out can have been further developed. Since 1957, afforestation by olive planting is adding a third layer to the palimpsest that is the map of Bajda Ridge.

A.VI. WIED TAL-PWALES (Fig. 104)

This fault-controlled alluvial basin shows little topographic diversity. The differing character of the bordering areas (see Chapter I B) is, however, reflected in the agriculture and the abrupt cessation of cultivation along the low Coralline scarp which forms the northern boundary of the lowland contrasts with the long slope on the southern side, where a transitional belt of dry farming leads up to the Wardija Uplands.

The relatively recent discovery of plentiful sub-soil water at shallow depth has allowed the relegation of dry-farmed crops to the hill slopes, though some cereals and legumes are still grown in the lowland as wind breaks and rotation crops. Yields from the large but intensely subdivided and fragmented fields (Fig. 104) are among the highest in Malta. Tomatoes, melons and artichokes are unusually important in the eastern half of the depression while, on the slightly higher ground in the west, potatoes and vines predominate.

This specialised and prospering commercial agriculture, relying on numerous small diesel- and donkey-powered pumps, is not without its ecological dangers. Already, after less than half a century's use, too lavish use of water drawn from a sea-level water table (Chapter I C) in combination with artificial fertilisers has resulted in an increased concentration of soluble salts in the soil. Surface inflorescences may be noted in many places and it would seem that some land has deteriorated. Social factors too have played their part in reducing productivity; one large block of land, abandoned by some 30 tenants following a dispute over rentals, stands out sharply on the wasteland map (Fig. 95).

There are a few large farmsteads in the centre of the lowland, but settlement is for the most part aligned along its edges.

A.VII. WARDIJA UPLANDS

These uplands have a diversity similar to that already noted in the case of Mellieha, but expressed on a considerably larger scale. The main ridge is flanked by embayments to the north and south, and, in the east, is divided into two prongs by the Wied Qannotta complex.

The northern prong, extending from the lip of Ġnejna to Wardija Hill, forms an irregular belt of wasteland in which the cols (as at il Hotba ta'San Martin (36)) stand out as small cultivated zones. Patch cultivation in solution hollows further diminishes the apparent barrenness. On the northern slopes, between the Wied tal-Pwales and the broken Upper Coralline escarpment, lies a series of embayments.

In the west is the elongated depression of Wied Ghajn Tuffieha (25). Tank-irrigated potato cultivation is particularly intensive near the valley-side hamlet though the crop range is generally diversified. Il-Palma (26) is a similar, although smaller pocket. Scattered settlement occurs in the wied bottom between an undercliff hamlet at the valley head and a lower hamlet at the valley-foot junction with Wied tal-Pwales. The Wied ta'San Martin (27) is much more linked with the plain to the north in that tomato cultivation is dominant even to the exclusion of many of the dry-farmed crops. The prosperity of this irrigated embayment is reflected in the large size of the several farmsteads. Il-Ballut (28) has more land devoted to cereals and vines. The more open embayment of the Wied Bufula (29) with its more extensive outcrop of Blue Clay possesses fewer *ġnien* characteristics. With a greater range of irrigated and dry crops, it is more akin to the Clay slope zones of other regions.

North of it-Żebbieh, at ta'Saliba Crossroads (34), the southern limb of the Wardija Uplands diverges from the main ridge and extends eastward to Ġebel Ghawzara. Narrow, and much broken by small wieds, this southern ridge has only discontinuous stretches of wasteland, which are concentrated on the hill

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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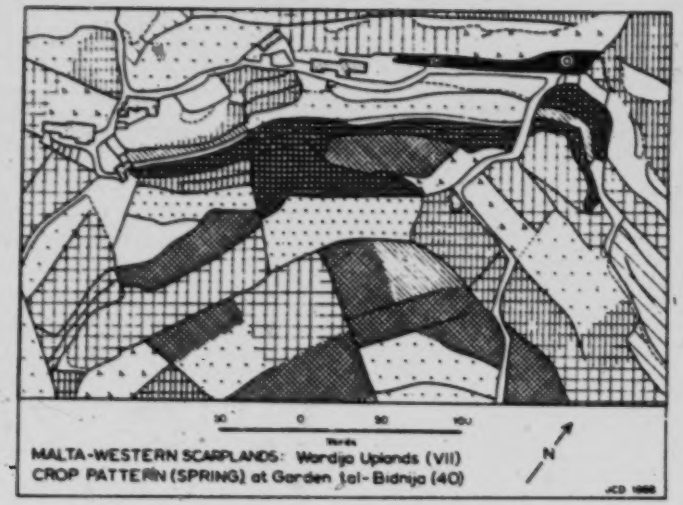

Fig. 105 Malta: Wardija Uplands.

tops. Around the many individual and clustered houses lie patches of cultivation in large pockets of Terra Rossa. Potatoes and cereals are dominant as at tal-Milord (39). South of the main ridge fork, this type of saddle topography falls away, between Mġarr and it-Żebbieħ to the downthrown Bingemma Basin.

East of it-Żebbieħ the Blue Clay outcrop zone appears, the southern extremity of a belt which overlooks the Wied il-Għasel and includes Wied Qannotta (33). On these well watered but non-irrigated clay slopes, vines, cereals and sulla are dominant. The grapes of this zone are of some repute and command a higher price than the more watery products of Bur Marrad. Fruit cultivation is carried on on the Ġebel Għawżara slopes (43), within easy reach of a main road. In the Wied Qannotta (33), a similar type of landscape occupies the depression between the two limbs of the summit ridge. A few *ġnien* pockets, as at the Garden tal-Bidnija ("the garden of the prosperous one") (40) (Fig. 105), lie beneath the Coralline scarp.

B. THE WIED IL-GHASEL DISTRICT

Overlooked by the eastern summits of Wardija Ridge and separated from the rest of the island by the fault-scarp of the Victoria Lines, lies a region which is quite distinct in character. Belonging neither to the Scarplands nor to the Central hill and plain region, the Qawra Peninsula (VIII), Wied il-Għasel (IX) and the Għallis Hills (X) merit separate attention.

B.VIII. QAWRA PENINSULA and B.X. GHALLIS HILLS

The physical unity of these two regions is broken only by the presence of Salina Bay which lies between them. Very striking is the way in which the distribution of wasteland corresponds almost exactly with the surface exposure of

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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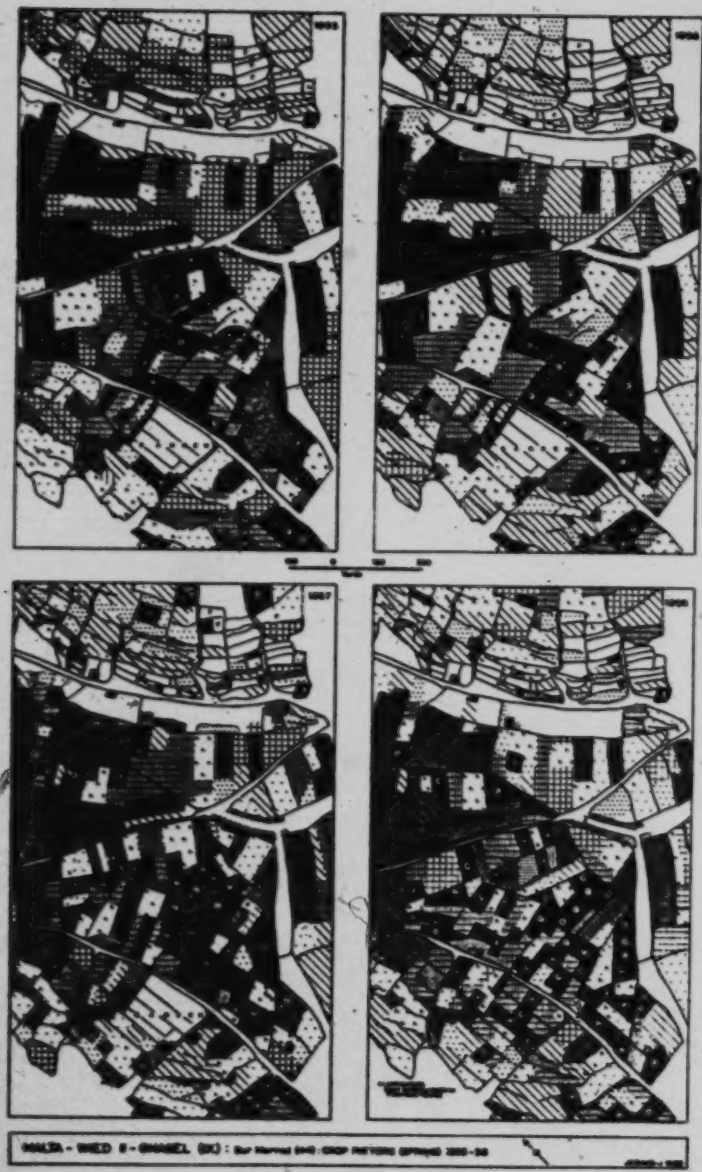

Fig. 106 Malta: Wied il-Ghasel

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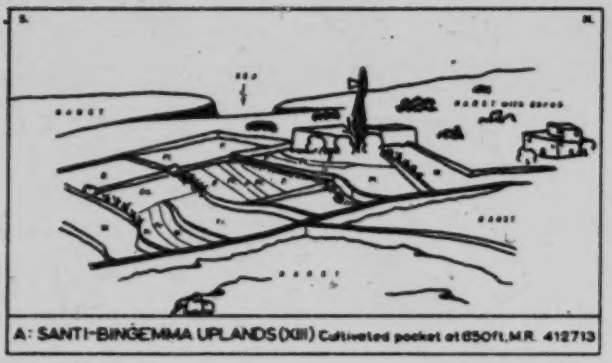
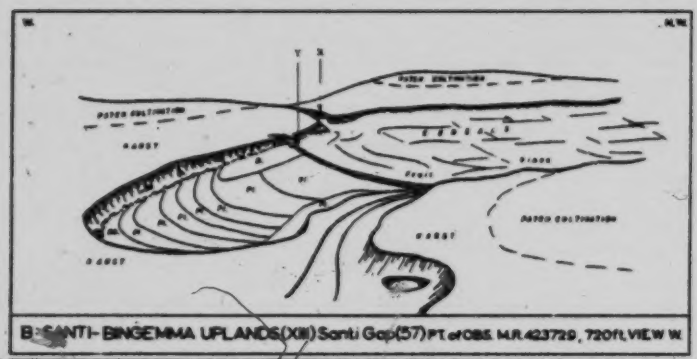


A: SANTI-BINGEMMA UPLANDS (XIII) Cultivated pocket at 650ft. M.R. 412713



B: SANTI-BINGEMMA UPLANDS (XIII) Santi Gap (57) Pt. of OBS. M.R. 423729, 720ft. VIEW W.

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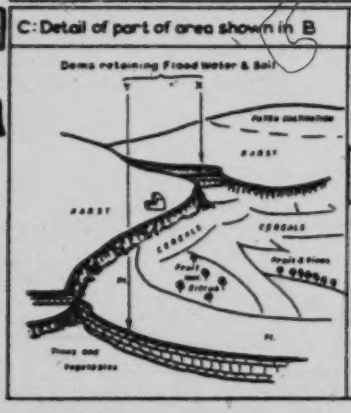

Fig. 107 Malta: Santi-Bingemma Uplands.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Lower Coralline rocks. This correspondence may be noted at the tip of Qawra, in a narrow strip at tal-Qraj (86), where the Coralline plunges under the alluvial infill of Bur Marrad, and inland from Qala San Marku. On the more tractable Globigerina, as at Bugibba (32) and il-Qasam ta'San Gorg (88), big-field cultivation of cereals and sulla is the rule (see also p. 197). Degree of exposure to northerly winds is a second factor controlling the farming pattern. In the sheltered depression of il-Maghtab (91), this is reflected in the greater importance of potatoes and the larger amount of settlement. These two regions have until recently been remote from the main streams of life and the recent construction of a coastal road linking St. George's and Salina Bays has, as yet, had little effect on society and farming.

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B.IX. WIED IL-GHASEL

In this large lowland, Lower Coralline and Globigerina rocks are covered by recent sediments of marine and alluvial origin which thin out west and south to expose the solid rock. Borings indicate a sediment depth of over 14 feet in the floor of the depression, at which level (approximately sea-level) a saline water-table occurs. Irrigation, in contrast to the practice in Wied tal-Pwales, is carried on only on the western side of the depression, where pumps tap water percolating from the Wardija Ridge catchment. Salinity prohibits irrigation at low levels. Consequently, below 25 feet, sub-divided, large fields carry a great acreage of vines flanked by belts of cereals and sulla on slightly higher levels. The storm-water course has itself been ploughed over, but in periods of heavy rainfall, e.g. October and November 1957, extensive flooding occurs and water has been known to lie for periods of several weeks. It is this low-lying area which bears the name Bur Marrad (44) literally meaning 'the sickly meadow' or 'the area where sickness occurs'.

Slightly above the 25-foot contour, where water-logging is less likely, a wider range of crops occurs. This is particularly marked at the junction of the two main watercourses - the Wied il-Ghasel and the Wied ta'Ghajn Rihana (Fig. 106) where vegetable cultivation becomes important. Artichokes, tomatoes, marrows and brassicas are irrigated by water led from the valley sides. On the marled slopes below the Victoria Lines, at Habel Ghendus il-Kbir (41), lie large fields of dry-farmed vines, cereals and sulla.

In the main lowland area, few trees or walls and no buildings break the flat landscape. Lines of farms lie along the tal-Qraj (86) edge, while small hamlets are growing up along the main road which follows the western break of slope. Deep-digger ploughs and caterpillar tractors make tillage activity in this zone most uncharacteristic of Malta as a whole.

[184]

THE WESTERN SCARPLANDS (continued)

A.XI. BINĠEMMA BASIN

The Wied ta'Ghajn Rihana rises upstream over a low saddle which leads from the Wied il-Ghasel to the higher Binġemma Basin. The structural and topographic asymmetry of this basin is paralleled by crop zonation. Cereals and sulla are dominant on the lower, northern floor below Mġarr and iż-Żebbieħ. Vines become more prominent on an east-west belt of higher slopes and these field crops become generally poorer with a southward increase in altitude. They are, however, diversified by several *ġnien* embayments which lie beneath the Victoria Lines scarp which defines the southern edge of the basin. These areas include Santi Gap (87) (Fig. 107) and the Wied ta'Binġemma (88). Irrigation is confined to the use of spring water in these pockets.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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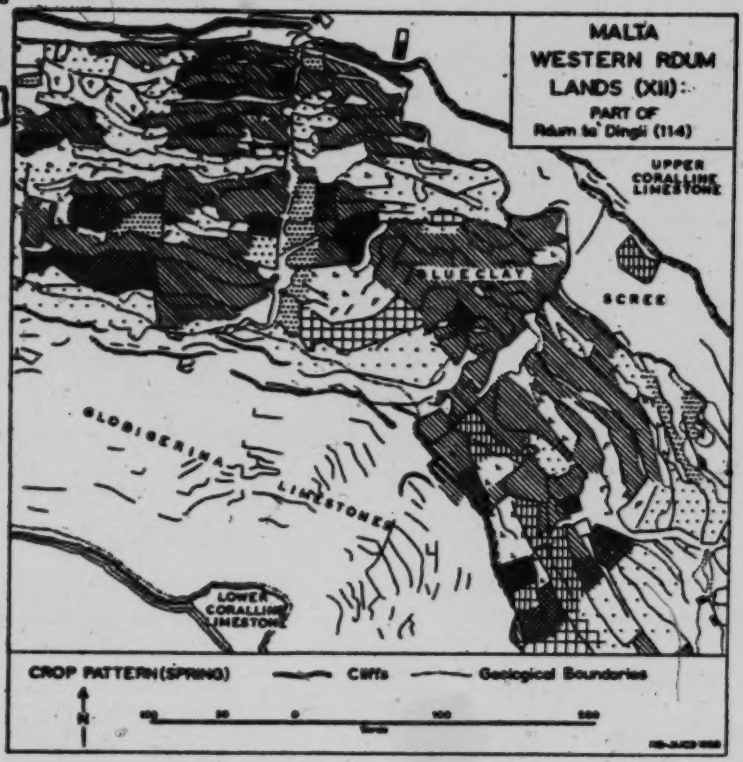

Fig. 108 Malta: Western Rdum Lands. Pt. of Rdum ta' Dingli.

Structurally and agriculturally part of the Binġemma Basin is the area west of the hamlet of l-Iskirvit (50). While Binġemma Basin proper is a zone of deep soil accumulation, this upstanding area is one of residual soils and Terra Rossa formation. On this exposed bluff a surprisingly large area is devoted to viticulture. There is a close working association between the western part of the Binġemma Basin as a whole and the Ġnejna *rdum* lands. (See also pp. 250, 251 and pp. 307-315.)

Settlement within this region is, with the exception of l-Iskirvit, entirely peripheral. Mġarr, the only centre with any true urban functions, is continuing to spread along the basin edge and roads, it-Żebbieħ showing similar characteristics on a smaller scale. Binġemma, by contrast a truly rural hamlet lying on an outwash fan beneath the southern scarp, has been overshadowed by the two northern settlements. L-Iskirvit, which marks the western edge of the main basin, has similarly stagnated.

A.XII. THE WESTERN *RDUM* LANDS

From the western edge of the Binġemma Basin southwards along the coast to tal-Bajjada (152), between the sea and the Upper Coralline edge, lies a zone which, in Maltese, bears the name of *Rdum* (=precipice). In parts of this zone,

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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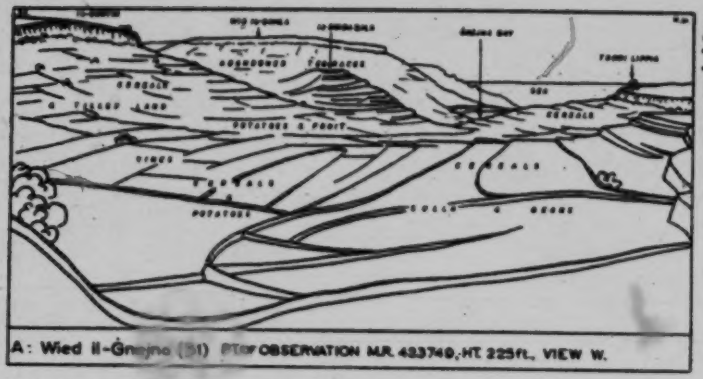
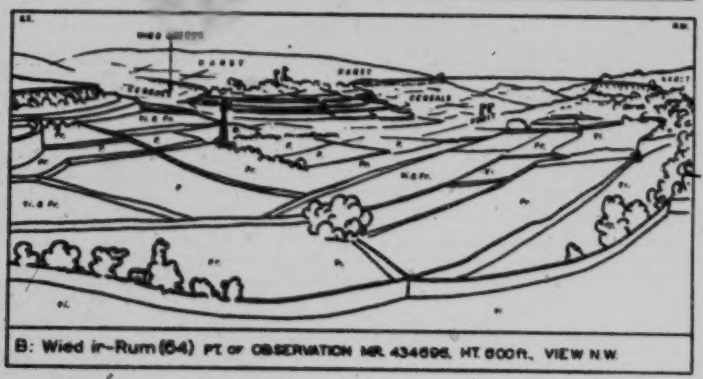
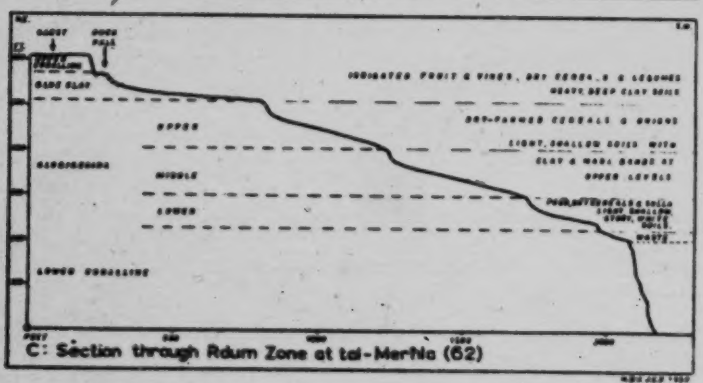


A: Wied il-Gnejna (51) PT OF OBSERVATION MR 433749, HT 225ft., VIEW W.



B: Wied ir-Rum (64) PT OF OBSERVATION MR 434695, HT 600ft., VIEW N.W.



C: Section through Rdum Zone at tal-Merlic (62)

Fig. 109 Malta: Western Rdum Lands.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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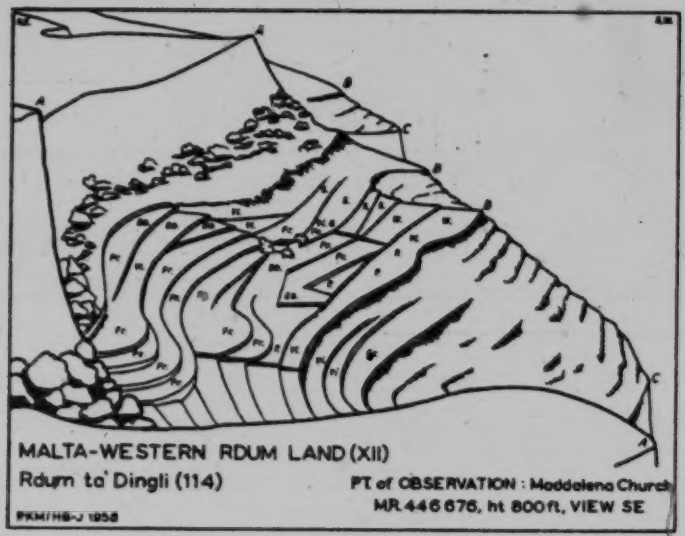

Fig. 110 Malta: Western Rdum Lands.

as, for instance, in the Rdum ta'Dingli (114) (Fig. 108), the cultivation of steep, narrow terraces between formidable cliffs represents a desperate clinging to limited resources. In others, great embayments such as Gnejna (51) (Fig. 109A), l-Imtahleb (63) and Wied ir-Rum (64) (Fig. 109B) offer greater and more easily realised opportunities for specialised farming. In all cases in the *rdum* zone is found a cross-section of the complete geological sequence found in the Islands and this exerts a close control over topography, hydrology, soil-formation and land use. Ideally, and as may be seen at tal-Merħla (62) (Fig. 109C), belts of cultivation lie between the Upper Coralline scarp-cliff and the sheer sea-cliff of the massive Lower Coralline. Zonal differentiation is otherwise controlled by the incidence of springs from the Upper Coralline cap, by differences in gradient and by minor variations between the different beds within the Greensand, Clay and Globigerina series. Although the aspect of the *rdum* lands suggests exposure to strong westerly and south-westerly winds, in fact they often lie in a pocket of calm air below the main airflow which is deflected up and over the *rdum* belt by the high sea cliffs. As evidenced by terrace walls, cultivation has been more extensive in the past. Abandonment is still proceeding and is most rapid in areas which are either most difficult of physical access, e.g. Rdum tal-Vicarju (61), or most remote from settlement, e.g. tar-Raheb (60) ('the place of the hermit').

The most simple type of *rdum* cultivation is exemplified in the narrow sea-facing zone including the Rdum Dun Nazio (80) and the Rdum ta'Dingli (114). Figs. 109C and 110 show the close inter-relationship between geology, slope and cultivation. Three major breaks of slope result from differential erosion. From the Upper Coralline cliff edge (marked A in Fig. 110) a steep cliff falls to a concave slope of gentler gradient on the Blue Clay and Upper Globigerina. Here, on the spring-watered terrace-retained mixed soils, typical *ġnien* crops are found. Below the break of slope B and on the steeper convex slopes of the Middle and Lower Globigerina beds lie a series of abandoned narrower and more inaccessible terraces. Points marked C indicate the line of the upper surface

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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of the Lower Coralline outcrop which forms a last vertical seacliff.

More complex is the longer and wider platform of the Rdum tal-Lunzjata. A narrow *gnien* zone stretches along the well watered Blue Clay spring zone. On the wide and gently sloping Globigerina platform medium grade dry farming is practised wherever the soil cover has been terrace retained. The lower edge of this belt is now eroded by the abandonment which has already laid waste the narrow belt of precipitous terraces which fringe the Lower Coralline sea-cliff. This region is essentially transitional between the true *rdum* lands and the wied-head zone (XVc) of the Central Region. Large enough to support two small hamlets and several large farmsteads and served by a good road which makes the shrines of Lunzjata and Karmnu accessible from the Central Region, this district appears to be more stable, ecologically and economically, than most of the western coastlands.

Lastly can be distinguished several great embayments which extend the coastal *rdum* characteristics into the interior. At l'Imtahleb (63) and Wied ir-Rum (64) considerable expanses of land lie between the 200 feet contour and the Lower Coralline sea-cliffs. Along the upper scarp springline from which run many rivulets and streams, so rare in Malta, vine and fruit cultivation characterises an extensive *gnien* belt. In the Wied ir-Rum, wind pump irrigation extends intensive cultivation on to the large fields on the gentle central slopes (Fig. 109B). Where water is less plentiful, as at tal-Mierhla and on the small Globigerina hills in the middle of the embayment, good dry-farming on marl soils is distinguished by a singular predominance of onions. On a much smaller scale but essentially similar are the two small valleys which open on the bay of Fomm ir-Rih; Wied Gerżuma (58) and Wied tal-Bahrija. Further north is the intermediate sized Ġnejna. The name, a plural form of *gnien* (garden or orchard), indicates the main characteristics of land use.

The human forces operating on this region as a whole are exemplified by the striking contrasts of detail and trend between Ġnejna and l'Imtahleb. Although the former is not over-difficult of access and is very near the flourishing centre of Mġarr, land is steadily being abandoned in favour of more easily worked but poorer unused land in the Binġemma Basin; settlement is completely absent. L'Imtahleb is sufficiently extensive and accessible to support a considerable number of farmsteads. At the same time, Rabat, one of the main island markets seems sufficiently close to encourage commercial specialisation while there is no immediately neighbouring attraction to draw effort away from the *Rdum*.

A.XIII. SANTI-BINĠEMMA UPLANDS

These Upper Coralline hill-lands are very similar in general character to the Wardija Uplands (VII). Waste, which fringes the Victoria Lines escarpment, is also widespread over the higher parts of the plateau interior. There is some patch cultivation of poor fodder crops, particularly barley and vetches. As shown in Fig. 107, slight depressions are occupied by small, scattered, but often irrigated holdings. On all sides, cultivation penetrates up the fringing valleys to lap over on to the neighbouring heights as in the Bahrija - l'Imtahleb (65) and Santi-Binġemma (67) districts. A higher standard of cultivation and a wider crop range, including broad beans, peas, onions and some potatoes distinguishes these areas from those of true upland farming. An exposed, narrow ridge extends eastward to separate the Binġemma Basin and the Wied Qlejgha. Even here, at id-Dwejra (96), a pocket of cultivation occurs in the lee of the scarp edge.

In general, the quality of farming in this region is affected by remoteness and exposure. Thus the largest blocks of wasteland include the inaccessible and bleak *xagħra* lands overlooking the sea in the west and, to the north, the Torri Nadur uplands (68). Compared with the associated plateau of Rabat-Dingli, this region is ill served by communications, far from main centres of life and sparsely populated: it is the wildest and most isolated district of Malta.

A.XIV. RABAT-DINGLI UPLANDS

This region is linked to Santi-Binġemma by a narrow Upper Coralline ridge. The latter, sapped from west and east by the Wied ir-Rum and Wied l-Isma (77),

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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MALTA - Rabat - Dingli Uplands (XIV) : CROP PATTERNS (SPRING)

A: Field at Xaghra tas-Swatar (M.R. 453609) ↑ C: Hofret in Rizz (75-M.R. 435600)
B: Fields at Busugrilla (105-M.R. 451714) N ----- Land Holding Boundaries

Fig. 111 Malta: Rabat-Dingli Uplands.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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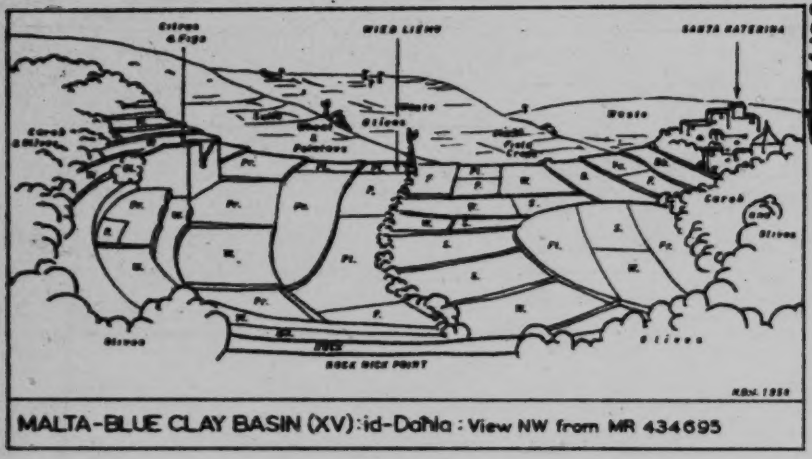

MALTA-BLUE CLAY BASIN (XV): id-Dahla : View NW from MR 434695

Fig. 112 Malta: Blue Clay Basin: Wied l-Iemu.

has, developed within it, the large solution hollow of Hofret ir-Rizz (75) (Fig. 111C). Bounded by a low Coralline cliff under which lie five farmhouses, and infilled with deep, red soils, this almost circular depression has often been erroneously identified as a circular fault. It is intensively cultivated for potato, vegetable and fruit crops and sub-division of the wind-pump irrigated land is extreme.

Around Hofret ir-Rizz lie dry-farmed fields of cereals and sulla interspersed with wasteland. The name of neighbouring Misrah tas-Suffara ('the open place of the whistle' - a possible reference to shepherds' pipes) gives an indication of the character of the open, non-irrigated upland here and over the remainder of the region, where dry-farming and *xagħra*-grazing areas are interspersed. Most of the eastern promontories of Xagħra ta l-Isqof (129) and Gebel Ciantar are so used. Similarly, behind the Upper Coralline cliff overlooking the sea, extends an area of virgin karst, abandoned land and some small reclaimed plots.

Between these more exposed lands are many small pockets, intensively cultivated under potatoes, legumes and a relatively large number of vegetables. The small, walled fields cluster around groups of wind-pumps and tanks as at ix-Xagħra ta'Swatar (Fig. 111A) on the Rabat Plateau (109). Irrigation water, extracted by wind- and motor-pumps, is available almost everywhere on these uplands. The density of pumps suggests that extraction is dangerously large (see also Chapter I C). Already in 1955 farmers in the tal-Pitkal district (82) were obliged to stagger periods of pumping and a large number of abandoned wind-pumps emphasise the hydrological instability. In 1956 the Maltese Government, in order to avoid such dangers, imposed a general ban on unlicensed well-drilling.

In this region, the urge to cultivate intensively results from the demands of Rabat as a consuming and marketing centre. At Busugrilla (105) (Fig. 111B) this is manifested in very specialised market-gardening around a flourishing hamlet which stands on the Fiddien road. Well linked by roads to the rest of the island, possessing in Mdina-Rabat the old capital which is still of considerable importance, and also carrying much dispersed and hamlet settlement, these uplands stand out from other Upper Coralline regions by reason of their more intensive land use.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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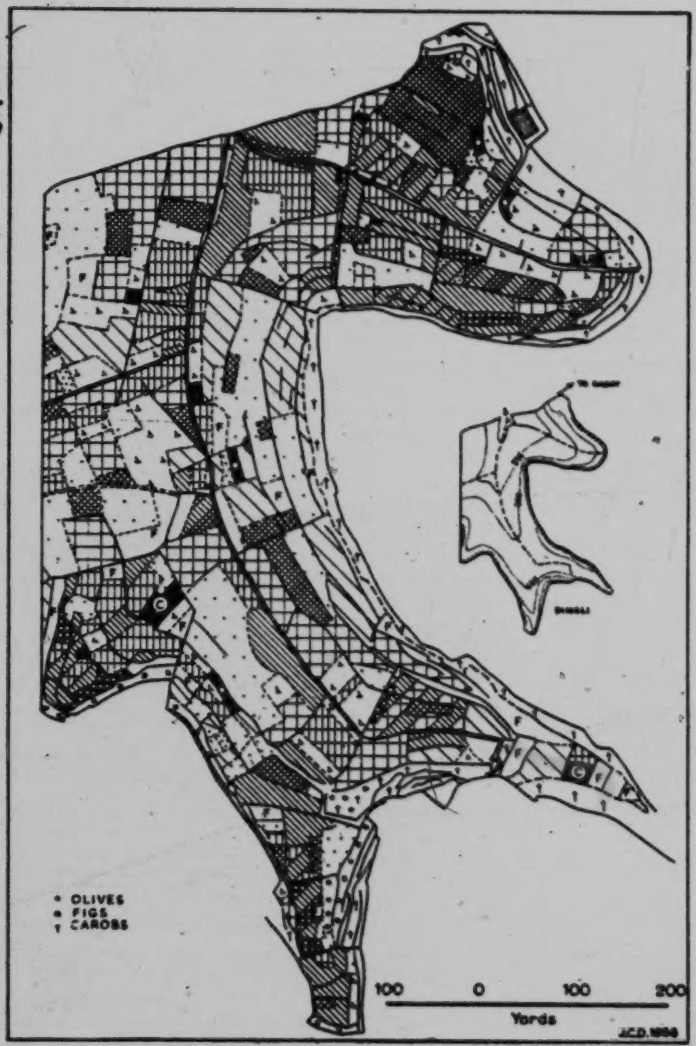

MALTA - BLUE CLAY BASIN (XV) Wied I - Iemu (77)
CROP PATTERNS (SPRING) —— Walls ---- Plot Boundaries

Fig. 113 Malta: Blue Clay Basin: id-Dahla.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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A.XV (a and b). THE BLUE CLAY BASIN

Between the Santi-Bingemma and Rabat-Dingli Coralline uplands lies a basin-inlier of the Blue Clay, drained by the upper Wied Qlejgha. In this region has developed a distinctive physical and agricultural landscape otherwise to be found only on steeper and more restricted fringe-slopes of the Western Scarplands. This is by no means a homogeneous region. On the northern and eastern edges the basin is sharply defined by Upper Coralline cliffs, while to the west it rises more gently on to a low coralline platform, transitional towards the upland proper. A discontinuous spring-line marks the geological boundary of sub-region XV (a) and *ġnien* farming is particularly well developed at the heads of the tributary wieds such as Ghemieri (69), l-Iemu (77) and id-Dahla (Fig. 112). At a lower level, wind-pump irrigation supports some fruit and vegetable cultivation among large, rich fields of wheat, sulla and vines. Here is the district of Fiddien, proverbially noted for its productivity: '*Mill-Fiddien il-qamh joħroġ bil-ħejjiel u l-qoton joħroġ bil-wizzien*' - 'From Fiddien wheat is collected in huge quantities and cotton in great weight'. This proverb dates from a period when cotton was one of the most valuable crops and was widely cultivated in this district.

As may be seen in the case of Wied l-Iemu (Fig. 113), intensive land-use is confined to a relatively small total area, average intensity being reduced by the large acreage of lower value 'dry' crops. The use of irrigation water has merely extended the normal crop range by the addition of fruit and vegetables. Wied l-Iemu, in contrast with Wied tal-Pwales, has not been transformed by any commercial specialisation. The impression left with an observer is one of peasant insistence on diversity, which is surprising considering the possibilities of the area. This occurs despite the proximity of the Rabat market, the adequate communications, and the town-dwelling character of the cultivators. There is very little dispersed settlement within the region.

On the Upper Coralline platform of the western sub-region XV(b), smaller fields of peas, beans and vines are interspersed with irrigated plots of potatoes. The main difference between this area and the Blue Clay inlier appears in the smaller acreage devoted to wheat and sulla. Irrigation is invariably with wind-pumps and wells even in the upper Wied il-Busbies (72). A further contrast is provided by the presence of farmsteads, both dispersed and clustered.

A.XV (c). THE PLATEAU-PLAIN TRANSITION ZONE

Along the eastern flanks of the Rabat-Dingli upland, extending from Mtarfa to tal-Bajjada (152) runs a continuous outcrop of Greensand and Blue Clay. From the Upper Coralline scarp, sweeping slopes fall to the Central plains developed on the Globigerina beds. Sharply incised wieds, separated by plateau promontories, carry this zone westward into the uplands. A spring-line zone occurs at the junction of Upper Coralline and Blue Clay and is particularly well-developed in the wied re-entrants.

In this zone, fruit cultivation of a specialised *ġnien* type is more intensive than in any other region of Malta. At Girgenti (143) and Wied ix-Xagħri (142) below the Inquisitor's Palace, and at Buskett (140) near the old summer palace of the Grand Masters, Verdala, specialised fruit (especially citrus) and vine cultivation are carried on in dense orchards. In the former case and in the lower stretches of Buskett, much land is cultivated by Siġġiewi farmers. (see also p. 299 and Fig. 136.) The grounds of Verdala palace, which also include a landscaped garden of exotic trees (shown on the map of non-agricultural land, Fig. 97), are farmed directly by the Maltese Government particularly for vine products. Northward along the plateau edge the typical springwatered *ġnien* crops become progressively less important through Wied ta'l'Isqof (128) (Fig. 117 A) to Mtarfa. It seems probable that this results from decreasing spring-water availability from the narrowing Coralline plateau.

Below the narrow *ġnien* zones under the promontories and merging with the wied mouths lies a belt of superior dry-farming. In this downwash zone obscure soil changes and a downward decreasing plenitude of ground water mark a transition region between western and eastern Malta. This, although possessing

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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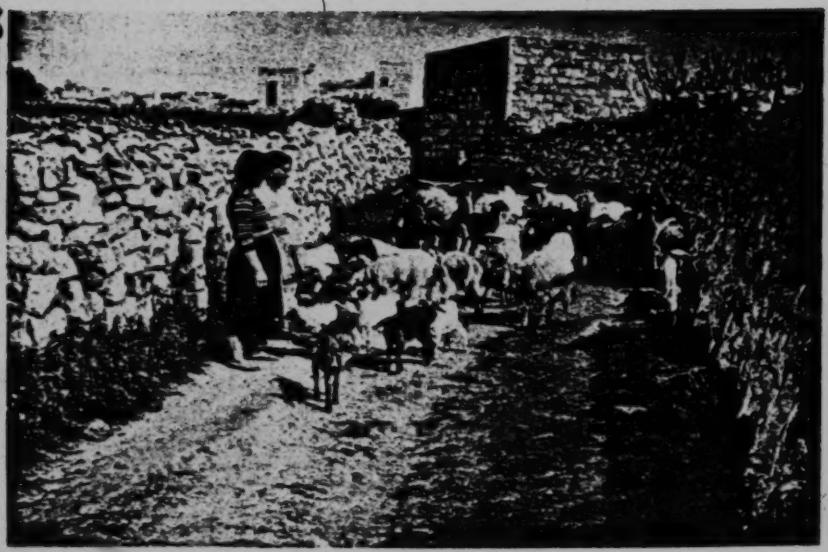

Plate XVII. Roadside grazing of goats.

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Plate XVIII. A farming family.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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a but arbitrarily defined eastern limit is clearly distinguishable in the field by the large ramped rather than terraced fields of mixed good dry farming. 241* 311*

C. THE HILLS AND PLAINS OF THE CENTRE AND EAST

This area possesses a certain unity based on physical and human characteristics. As noted in Chapter I B, the landscape, although presenting a deceptively monotonous appearance to the eye, is in places emphatically dissected and the altitudinal range is fairly great (Fig. 1). The importance of minor relief features in this region is magnified by its relative uniformity; this in contrast to the scarplands of the west. 311*

There is also a less simple relationship between altitude, aspect and climate. Exposure to sea winds adversely affects many coastal districts. Away from the coast, land temperature conditions assume a greater importance in the development of local climates. Thus, even under insular conditions, regional contrasts between the interior and the periphery are marked (see Chapter II). [132]

In this eastern half of the island is found the core of Maltese life, both urban and rural, and links between town, village and country are everywhere close. There is no really widespread development of dispersed settlement. As noted in Chapter VI, Valletta (il-Belt) is the focus of a series of concentric zones of human activity. Around it lie, first, the residential and industrial towns of Sliema, Hamrun, Pawla and the Three Cities. Beyond these are large settlements in which urban and rural activities are intermingled but in which the former predominate. These include Birkirkara, Qormi, Tarxien and Żabbar. Clearly distinct, a third type of settlement, here termed *casal* or township, lies in an outer ring. This comprises Gharghur and Naxxar, Mosta, Żebbuġ, Siġġiewi, Qrendi and Żurrieq, Ghaxaq and Żejtun. Each of these forms an independent centre for rural life and each has developed some limited urban function. 311* 361

Inside this zone lie smaller settlements of varying character. Lija and Attard are increasingly attached to the growing 'suburban' development spreading westwards from the Valletta conurbation. Kirkop, Safi and Gudja are country villages, while Mqabba and Luqa have some non-rural additions. Along the eastern coast, with its fine natural harbours, are to be found the old fishing villages of Marsaskala and Marsaxlokk. At Birżebbuġa and Kalafrana, this traditional function has been submerged by more modern developments.

Communications are generally good and public transport services frequent, thus there are few areas of real remoteness. Throughout this part of the island, the attraction exerted by the Valletta conurbation affects all sectors of social and economic life. The larger casals have their own independent gravitational pulls. At either end of the rural-urban continuum, decline in rural life is taking place. The smallest villages such as Safi are losing population to their larger neighbours while on the fringe of the conurbation, part-time farming spreads over an ever-increasing area. 311* 369

Thus the character of cultivation in this part of Malta is the product of many interacting human and physical factors. These interactions combine in various ways to differentiate the five major and many minor regions considered below. 241* 311*

C.XVI. WIED QLEJGHA

From the Upper Coralline col at Ghajn Qajjet, Wied Qlejgha passes over a narrow outcrop of Blue Clay to become more open on the Globigerina beds, before entering the gorge of the Wied ta'l-Isperanza (101), cut in the Lower Coralline.

This is a transitional region between the West and Centre and suitably enough displays all the characteristic types of farming and crop assemblage. At Ghajn Qajjet, below Upper Coralline plateau *xaghra*, lies an intensively cultivated *ġnien* zone, mirrored on a smaller scale on the Blue Clay slopes below Mtarfa. On the terraced wied floor flanking the Chadwick lakes, good dry farming including viticulture is practised. The intermediate slopes of the basin are dry-farmed in

[Text Continues on P. 258-B]

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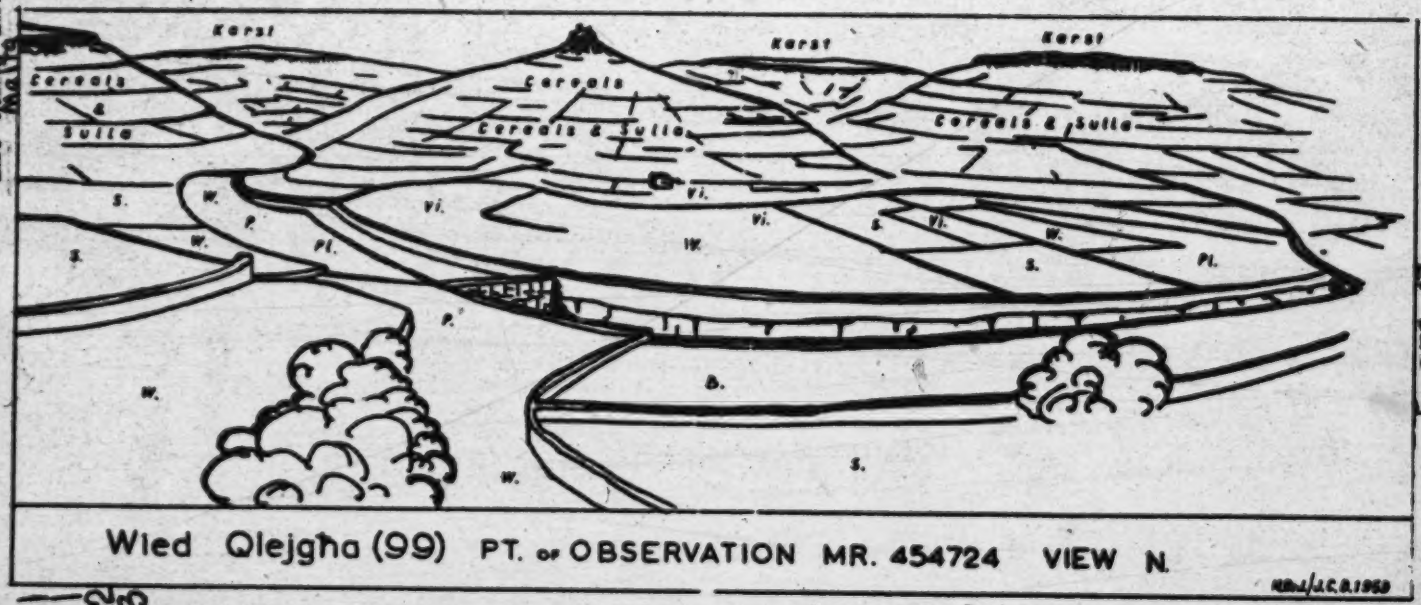

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Fig. 114 Malta: Wied Qlejgha.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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large ramped fields (Fig. 114). This last zone merges with the open lands on either side of the Wied ta'l-Isperanza at the line of transition with the Central Plains. To the west towards Falka (93) and Besbesija, cereal and sulla fields rise to the Lower Coralline cliff-edge waste of the Victoria Lines.

At the junction of the Wied Qlejgha Region (XVI) with the Naxxar-Gharghur Hills (XVII) stands the gap-town of Mosta. This settlement has grown rapidly over the last 60 or 70 years so that it is now, both in size and population, the largest of the casals. This development is undoubtedly connected with Mosta's position. Controlling as it does the lowest gap in the Victoria Lines and sited where central and northern parts of the island meet, the casal has benefited from the expansion of commercial farming in the latter region. Improvements in communications and particularly the great increase in the use of motor transport over the last 30 years have also had their effect. The bridging of the Wied ta'l-Isperanza on the northern outskirts of Mosta has opened up a relatively easy route to Wied il-Ghasel and the north, a fact reflected in the way in which the more recent growth of the settlement has been mainly along its southeast-northwest axis in contrast with its previous alignment from northeast to southwest.

C.XVII. THE NAXXAR-GHARGHUR-HILLS

These, the highest of the Globigerina hill-lands, rise to over 400 feet and are dissected by a series of radially arranged, deep wieds. Aspects and slope are the main controls on agriculture in this region, though man-made features, particularly quarries, considerably affect the details of utilisation. The distribution of wasteland is largely determined by outcrop and gradient although the inter-relationship is by no means a simple one. Steep gradients themselves do not inhibit cultivation as is shown by the contrast between Wied l-Iklin (164) and the gentler slopes below tal-Balal (174). Similarly, exposure to northerly winds is far from constant in its adverse effects on farming, witness the cultivated heights immediately north of Gharghur, contrasting with the much-abandoned, though more sheltered Wied Ghomor (173). The most continuous belt of waste extends along the Victoria Lines, including the narrow northern scree slope and the wider ridge-top developed on Lower Coralline rocks. Viewed from the sea, the bare, grey cliffs at Madelena and Gebel San Pietru (154) appear impressively stark. The southward discontinuous extension of wasteland between Mosta and Naxxar is closely coincident with the Lower Coralline outcrop. However, on these gentle, sheltered slopes, the close proximity of the two major casals has encouraged the maintenance of land in cultivation, potatoes being widespread. This is one of the very few districts in which a relatively high

[p. 258-B]
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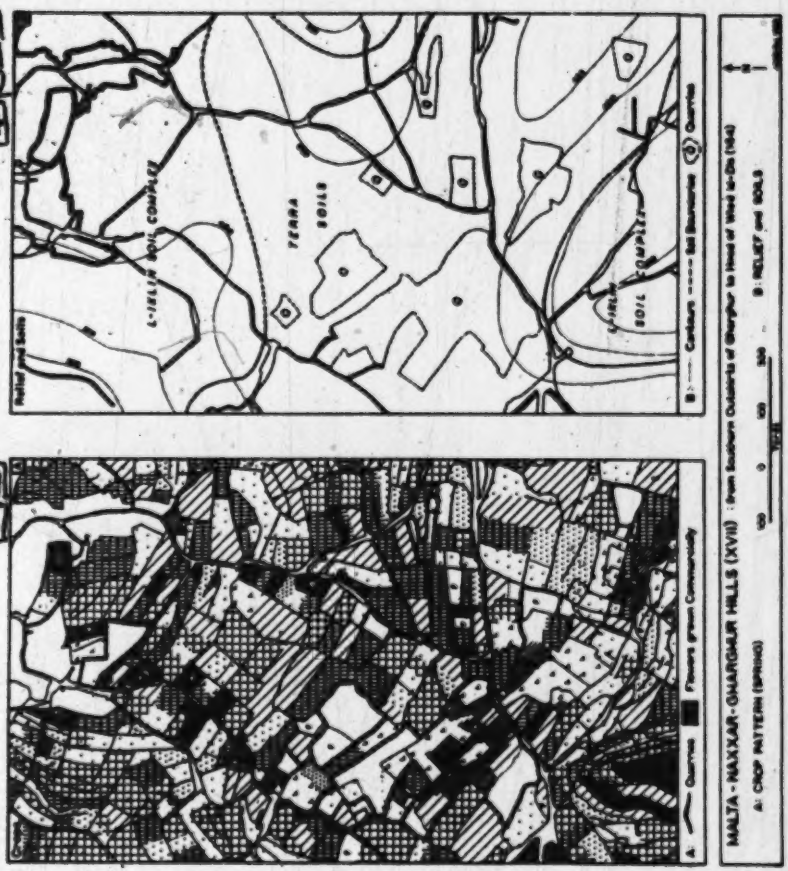

Fig. 115 Malta: Naxxar -Gharghur Hills.

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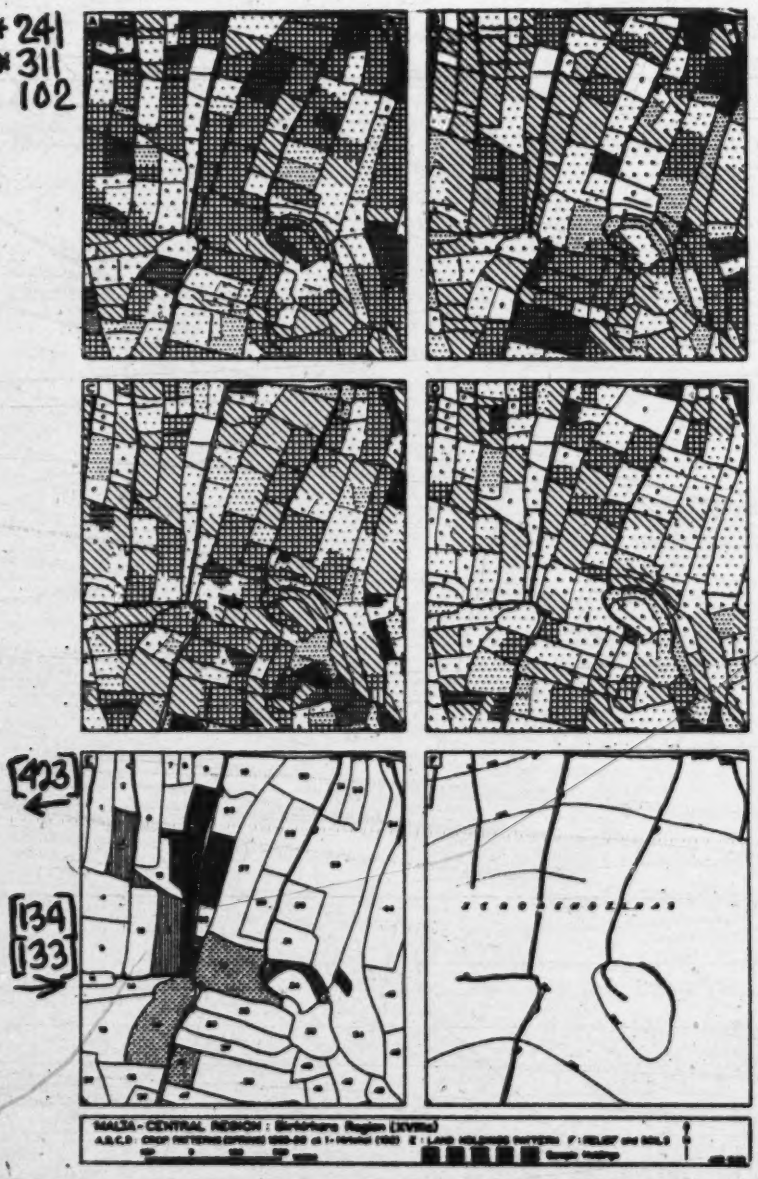

Fig. 116 Malta: Central Region: Birkirkara Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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intensity of cultivation exists on soils derived from Lower Coralline rocks. 241*

On the rich, red loams of the summits, minor variations in topography and aspect influence the detailed distributions of a wide range of crops. Only vines and fruit trees are generally absent. Potatoes, grown to some extent in all parts of the region, are least plentiful on the tops of the north-facing spurs where vetches, the hardiest legumes, are particularly important. On the saddle between Naxxar and Gharghur, there are large, level fields of wheat and sulla. At similar levels eastward towards the Wied Ghomor, the standard of cultivation declines and the incidence of waste and poor fallow increases. To some extent this reflects the widespread use of land for quarrying, which is particularly important in this area. Many farmers do not till land which is to be thus utilised in the near future while worked-out quarries are often reclaimed. These latter form well-watered and sheltered pits which may be used for fruit and vegetables in districts otherwise environmentally ill-suited to such crops (Plate XV).† Fig. 115 illustrates an area with quarries in different stages of use. 311*

Defining the bluff on which Gharghur is situated are three north-facing wieds of differing physical and land-use character. Here, extremely narrow fields contrast with the large enclosures of the summits. Very steep slopes of gradients up to 1 in 2 have been terraced with walls often 10 or 12 feet high. Wied Anglu (188), although less steep than the other two, is largely wasteland, being floored by intractable Lower Coralline. The Wieds ta'Santa Marija ta'Zulliega (185) and id-Dis (187) have much in common. Intensity of cultivation generally varies with distance from Gharghur. The crops represented are potatoes, cereals, sulla and vetches, and it is noteworthy that the first of these is most plentiful near the settlement.

One valley, the Wied l-Ikliin (184) runs south from the main ridge. Southerly aspect and the availability of some spring-water make this a more productive valley than those of the north. Vines fill the wied-head pocket and potatoes, with a little fruit, are grown on the wied floor. The narrow valley-side terraces are given over almost entirely to barley.

The eastern slopes of the region are pierced by a series of wieds. The most striking feature of this district is the large amount of abandoned land occurring on hill-top, valley-side and wied-floor alike (Fig. 95). This district, lying as it does on the edge of the expanding conurbation, illustrates the effects of urban growth. In the first place, much land is sterilised by building operations and by the land transfers which precede them. Secondly, the urban growth which is cutting into the farmland is itself a product of internal migration from country to town. Thirdly, this physically marginal land is especially vulnerable to such attack. The southern hill slopes, viewed from the south, present a superficially similar picture of abandonment. Such loss of agricultural land is most rapid above the Wied Ghollieqa (189) behind Ghira. Further west, away from the conurbation, most land is still tilled.

The eastern and southern flanks of the Naxxar-Gharghur Hills are intermediate in gradient between the summits and the wieds. Fields are generally small and are devoted to a wide range of crops. While potatoes, cereals and sulla are the leading elements, minor crops are in total as important as any one of these, a balance which is infrequent in Malta. There appears to be no factor favouring any single major or minor crop. Vetches, broad beans, peas and onions each occupy approximately the same amount of land. Occasional high-walled enclosures shelter orchards and gardens (Plate XVI).

While in the western part of this region settlement is generally concentrated in the two main canals and the small village of San Pawl tat-Targa (180), to the east and south isolated farmsteads become dominant. Occasional small hamlets, e.g. l-Imsierah (178) have grown up at minor route junctions. Settlement and communications both tend to avoid the steep-sided valleys of the north and east. [361]

C.XVII. THE CENTRAL REGION

The east-west topographic grain to which attention is drawn in Chapter I B p. 26, is reflected in a similar arrangement of agricultural sub-regions as well as by the pattern of communications and settlement. There is, nevertheless,

† [See p. 190 -- Analyst]

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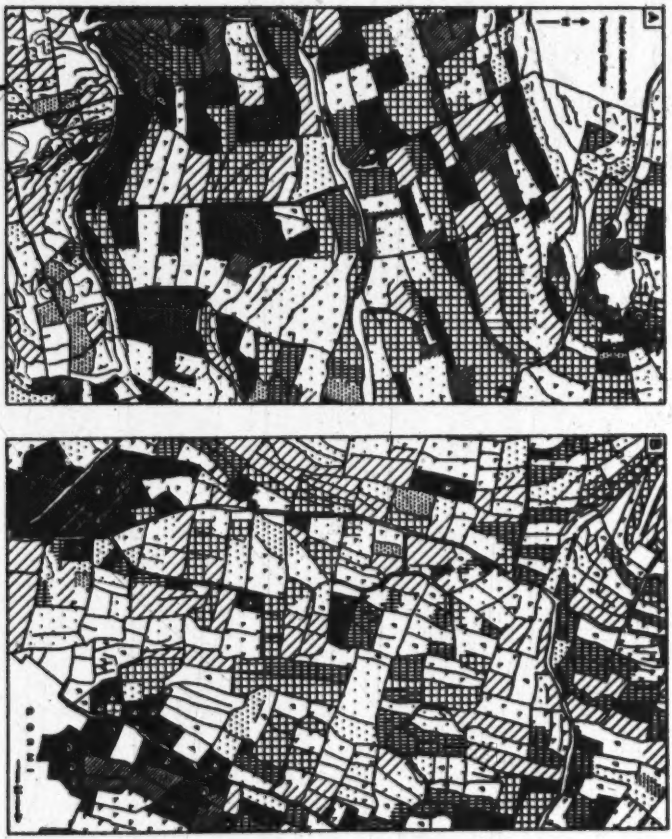

[p. 262-A]

[See P. 262-B for legend--Analyst]

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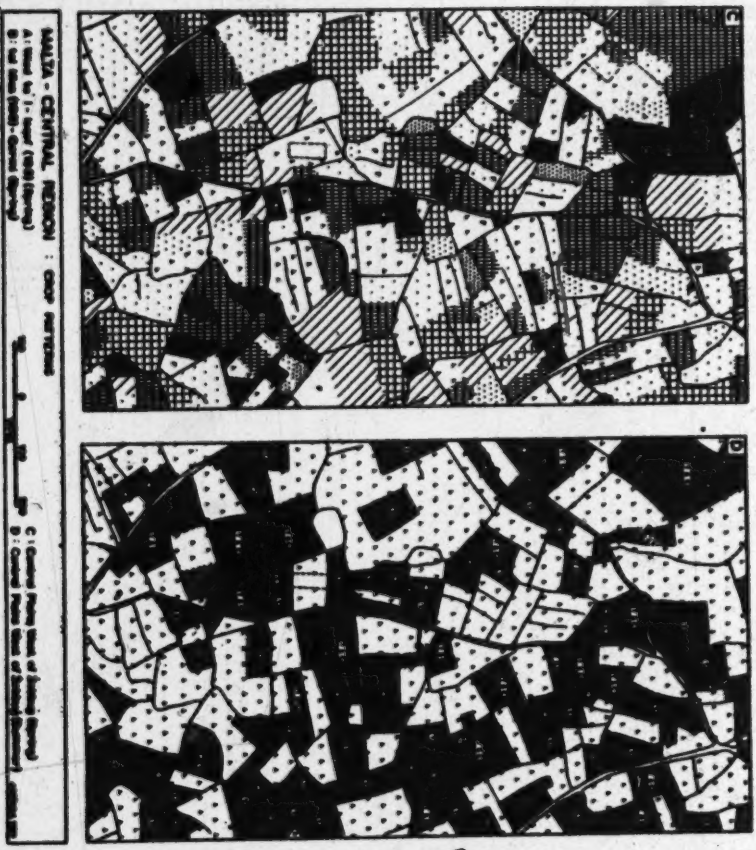

Fig.117 Malta: Central Region.

[p.262-B]

1: Bowen-Jones et al. K-S (1955-1958) 1961
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within each sub-region, a gradation from west to east reflecting the successional outcropping of the various Globigerina beds. These outcrops give rise to minor breaks of slope so that the Central Region as a whole consists of a series of broad, stepped platforms. These become less distinct to the east where relief is diversified by deep wied incision. 24|* 31|*

XVIII (a). THE BIRKIRKARA REGION

A long tongue of urban settlement stretches westward from the main conurbation linking it to the previously independent villages of Birkirkara, Balzan, Lija and Attard. The built-up area occupies the shallow depression of the Birkirkara-Balzan valley and extends up the slopes on either side. Where this valley deepens eastward into the Wied Musida (130), settlement diverges on to the Santa Vennera Ridge. A few isolated farmsteads are dispersed throughout the region, but most of the land is worked by inhabitants of the several urban settlements. [361]

The northern slopes rise to the edge of Naxxar-Gharghur Hills, and the crops of this district have the same diversified balance of potatoes, cereals, fodders and minor legumes as was observed on the flanks of that region. Small, irregularly-shaped fields and scattered farmstead settlement further strengthen the similarity. On the edge of the built-up area, more intensive land use is associated with urban farming, particularly at Santa Vennera. At San Anton there is an enclave of irrigated gardens and orchards which is only in part directly associated with the Palace.

Musida Valley has a character of its own. In high-walled gardens on the floor of the upper wied some fruit cultivation is practised but the steep sides of this narrow defile have largely been abandoned. The silt-charged waters which frequently flow down the valley during periods of heavy rain bear witness to the soil erosion consequent upon such abandonment.

South of the built-up area lies the low upwelling of l-Imriehel (192) (Fig. 116). A narrow belt of buildings is slowly encroaching from the north on to land otherwise devoted almost entirely to cereals and sulla. The large, dry-farmed fields are on the whole poorly cultivated.

XVIII (b). THE TA'QALI REGION

This high and level Globigerina platform is largely occupied by an airfield which has destroyed the former unity of the region. Cereals and sulla occupy a particularly large proportion of the surviving farm land. Beneath the Mdina slopes, viticulture is of importance in the Wied il-Hemsija (118). On the other side of the airfield, towards Mosta and Attard, potatoes are the main secondary crop. Cultivation throughout is generally of a high standard. [508]

XVIII (c). THE ŻEBBUĠ REGION

Running east from the Rabat-Dingli uplands, this region is defined on the north by the Wied is-Serda (194) and on the south by the Wied Qirda (202). In the west, where the wieds are shallow depressions rather than true valleys, there is no clear topographic break between the Żebbuġ Region and those to the north and south. To the east, however, though altitude decreases, the amplitude of relief becomes greater and a clearly defined spur stands between the deepening wieds.

On the high plains west of Żebbuġ (Fig. 117 C and D) is developed a particularly intensive type of dry farming. Cereals and sulla form the basis of rotations which include potatoes, vegetables and winter-fallowed land. Spring potatoes, mixed vegetables including summer brassicas, particularly cauliflowers, together with winter sulla and cereals are characteristic of this zone. The reasons for such an assemblage of crops are not altogether clear. The successional outcropping of Globigerina strata and intervening phosphatic nodule beds with consequent effects on soil development, the relatively high water table and distance from the sea would all seem to favour a highly productive form of dry farming but more investigation is required. Onion-growing is particularly characteristic of the environs of Żebbuġ, a lesser *pitkal* centre. Minor variations in crop assemblage are illustrated by Fig. 118.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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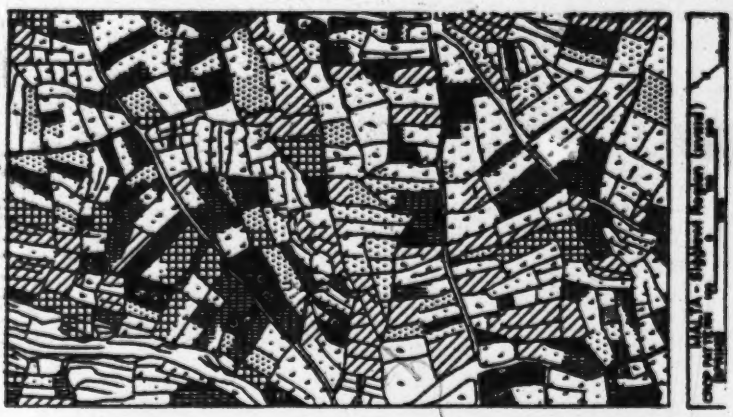

Fig. 119 Malta: Siġġiewi Region.

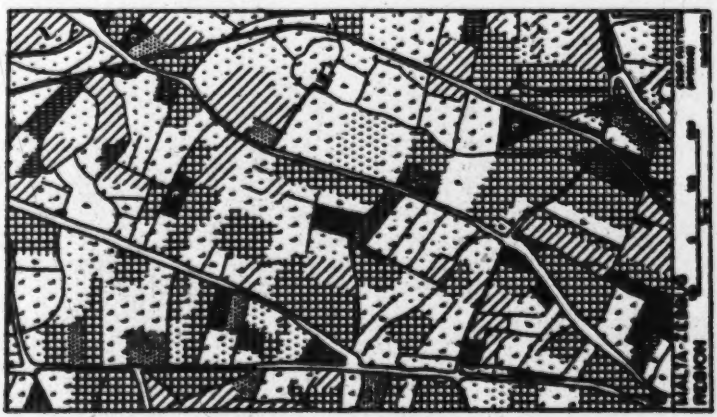

Fig. 118 Malta: Żabbar Region.

1: Bowen-Jones et al. K-5 (1955-1958) .1961
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On the spur of Ghar Ram (199) and tal-Handaq (200), the intensity of cultivation decreases eastward, cereals and sulla becoming dominant. The even slopes of tal-Ilias (198) drop northward to the more level Ghammieri district of the Wied is-Sewda. Gradient has little effect on the selection of crops grown in these areas. Cereals and sulla dominant throughout although potatoes assume a greater importance than on the summit. In contrast the southern edge of the ridge is more abrupt, falling sharply to the Wied Qirda. Precipitous terraces, standing above a storm-water channel cut in Lower Coralline rocks are almost completely abandoned. The only pocket of fruit cultivation in this region lies in the Wied Qirda above the main incision and close to Żebbuġ. 24|* 31|*

Scattered settlement of farmsteads and a few small hamlets is generally aligned along roads and tracks. The great majority of the land-holders, however, live in the casal of Żebbuġ which combines some urban functions with those of village settlement. [361]

XVIII (d). THE SIĠĠIEWI REGION

In many ways this region is a counterpart of that of Żebbuġ. The high plains west of Siġġiewi sweep south from ta'Brija (133) to tal-Bajjada to merge with the open Rdum tal-Lunzjata. Intensive dry-farming of cereals, sulla and vegetables is characteristic. Onion cultivation is of particular importance here as throughout the region.

From this western platform, the ridges of tal-Bordin (135), tal-Ghaqba (205) and ta'Haxxluq carry relatively high land to the east. Tal-Bordin is noteworthy only for the absence of early potatoes, possibly because of its rather exposed position. The place-name element *nadur*, meaning a look-out point, is significantly attached to the fields on this small ridge. The main ridge of tal-Ghaqba, carrying a variety of crops, is generally similar to tal-Handaq on the other side of Wied Qirda. The crop range is similar on ta'Haxxluq ridge, though the fields are generally smaller and the country more broken (see Fig. 119). In these eastern districts, the commercial farming element is most strongly represented by onion growing which is even more extensive here than around Żebbuġ. [103]

Siġġiewi itself was established on the south-western edge of the central settlement zone of Malta. The casal and outlying farmsteads were to some extent influenced by the need for protection from corsair raids. Walled enclosures and a few defensive towers indicate past insecurity. Siġġiewi still lies off the busiest lines of communication and the south-western part of the region is one of the least accessible districts of the central lands of Malta. Here, small hamlets cluster around isolated churches as at tal-Providenza (180). 311* 361

XVIII (e). THE QORMI REGION

The district around Qormi is atypical of the Central Region as a whole. A considerable number of motor-driven pumps extract water from the fault-fissured Globigerina beds and irrigable land constitutes a large proportion of the total area. Vegetable and fruit crops, the latter including citrus and even such exotics as the banana are grown intensively in this sheltered district (Fig. 120). The Qormi basin is a westward continuation of the Marsa lowland, an area of alluvial deposition (see Chapter II). Large farms with irrigated gardens surround the large casal (Fig. 117B). 24|* 311*

C.XIX. THE SOUTHERN REGION

A highland ridge with an average altitude of more than 400 feet extends eastwards from the Upper Coralline scarp at Lunzjata along the southern coast as far as Buheġra. Further east and towards the interior of the island, the land falls away in gentle slopes. Although [illegible] wasteland is confined to a coastal belt coinciding with outcrops of Lower and down-faulted Upper Coralline beds, much land has elsewhere been taken out of cultivation. The airfields of Luqa and Hal Far, still in use and their as yet un-reclaimed wartime extensions, together with large-scale quarrying on either side of Mqabba, have sterilised a great deal of land. [308] [316]

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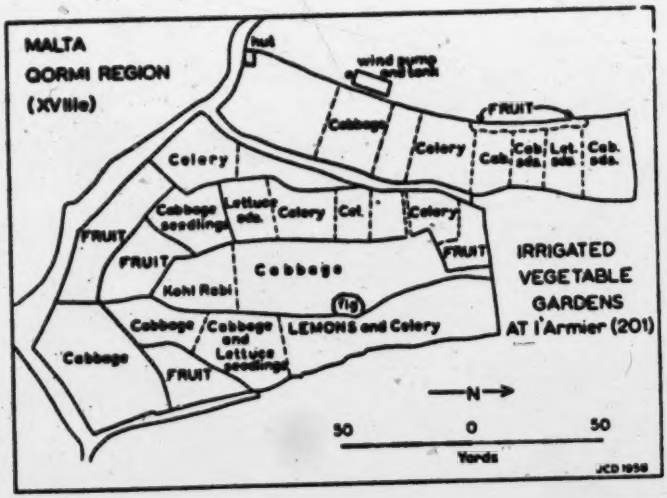

Fig. 120 Malta: Qormi Region.

XIX (a). THE MQABBA - KIRKOP PLAIN

Relatively intensive cultivation of a wide range of crops shows few noteworthy special features. An inverse relationship between the amount of land cultivated for cereals and sulla on the one hand and under potatoes on the other is apparent. The unusually massive concentration of sulla and cereal fields between Mqabba and Żurrieq may be compared with an equally marked concentration on potatoes around Kirkop and Safi. There is otherwise an even scatter of the normal dry-farmed subsidiary crops.

As over the Globigerina lands as a whole, dispersed settlement, while by no means absent, is clearly secondary to concentration in casals and villages.

XIX (b). THE SOUTHERN HILLS

The ridge lands are distinguished from the plain by differences in altitude, exposure, gradient, field size and accessibility. Fig. 121 illustrates some of the contrasts. Nevertheless, the crop range is not markedly different from that of the plains, save that the hardier legumes assume a greater importance. Onion growing would seem to be associated with local markets and with the difficulty of raising other vegetables.

[361]

The casals of Qrendi and Żurrieq lie at the junction of these hills with the interior plain. Their functions include marketing and contracting for both sub-regions as well as minor fishing activity. Żurrieq, the larger of the two, has become the chief centre of the region, incorporating within its extended built-up area the satellite villages of Nigret and Bubaqra.

C.XX. THE EASTERN REGION

As described in Chapter I B, this region is one of hill ridges and depressions. Although relief is subdued, there is little level land and relatively minor structural and topographic features have a disproportionately large influence on agriculture. The Main Water Table, which rises but slightly above sea level is nearly everywhere far beneath the surface. The need for dry farming restricts the crop range considerably, even vines being virtually absent. Variations in crop assemblage, which result from a variety of physical and human factors, produce six distinct sub-regions.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Fig. 121 Malta: Southern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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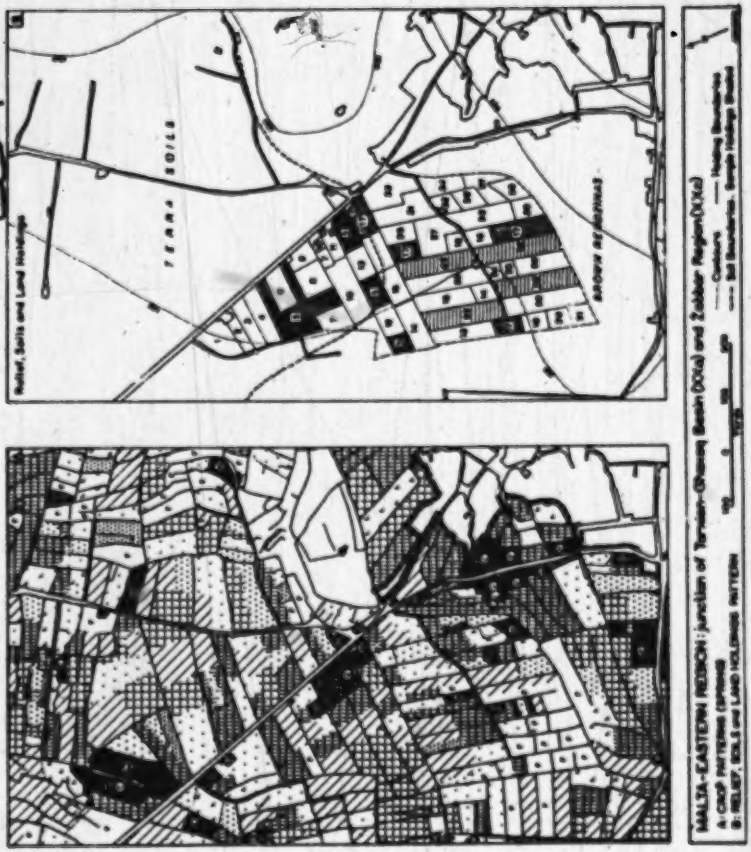

Fig. 123 Malta: Eastern Region: Tarxien-Ghaxaq Basin.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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XX (a). THE TARXIEN-GHAXAQ BASIN

This is the open upper section of the shallow Wied ta'Mazza which reaches the sea at Marsaskala. Rock weathering and slow soil formation on the periphery surround a central zone of deep soil accumulation. The deep-soiled district is one in which the upper surface of the Lower Coralline aquifers falls below sea-level and, compared with the remainder of the Eastern Region, ground water is of high salinity (see Chapter I B). The effect of this is to be seen primarily in the small area devoted to potato growing. This zone of large fields under cereals and sulla is surrounded by a belt of more intensive cultivation on the higher slopes, where fields are smaller and potatoes re-assume their normal importance in the crop range. Part of this latter zone, on the northern outskirts of Żejtun, is shown in Fig. 122.

Exceptional is an area of abandonment at il-Bur ta'Sufa (MR 373688), where it is believed that increasing soil salinity is primarily responsible. This small hill, once the site of the only clustered farm settlement in the sub-region, has also suffered from the attraction of the surrounding casals. Carob trees and crumbling terrace walls mark this out as the only area of difficulty in an otherwise tractable region.

XX (b). THE LUQA-ŻEJTUN RIDGE

A crescentic ridge, which separates the catchment areas of the Grand Harbour and Marsaxlokk Bay is crowned by a series of settlements. Near these, fairly intensive cultivation, best developed around Luqa, includes that of potatoes, onions and other spring vegetables. Where the soil mantle is thinnest and most subject to erosion, cultivation is poorer. For example, just north of Gudja, at ta'Salib (265), a harder bed in the Globigerina series has formed a small mesa as a result of differential erosion. The top and steep sides of this feature are marked by abandoned fields.

Much of the better land in this sub-region is now being taken up by settlement extension and road building, a process most marked between Żejtun and Ghaxaq.

XX (c). THE ŻABBAR REGION

The primary unity of this region is provided by general specialisation in the production of *garagħ bagħli* (dry-farmed marrows grown in spring: see Fig. 123 and p. 219). Subsidiary to this unifying feature are a number of diverse elements.

On the seaward slopes of the San Anard (244) - San Rokku (248) ridge, a belt of wasteland covers the barren shore and abandoned fields of minute size rising above it. North of San Rokku, abandonment is complete where these slopes coincide with a Lower Coralline outcrop. Near the growing village of ix-Xgħajra, patches of poor cultivation have survived. The whole of this district is one of particular difficulty. Coastal alignment of the ridge and its pronounced relief accentuate the effects of northerly winds, which carry sea-spray some distance inland. The extreme smallness of the walled enclosures indicates the need for shelter and it is not surprising that this exposed and difficult area should have been left derelict. On the 6-inch maps is marked a rectilinear pattern of proposed road and building development. As yet, ix-Xgħajra, a strange medley of farmhouses, suburban and sea-side villas, is the only realisation of the plan. It may well be that land speculation has here contributed to land abandonment.

The ridge top and its sheltered southern flank, with their larger fields, form a vivid contrast. This richer-soiled area is given over to a diversity of crops, *garagħ bagħli*, potatoes and other spring vegetables occupying as large an area as that under all other crops combined. This type of farming is carried southward across the rise of tal-Pitieri (251) and into the Wied ta'Mazza (257). South and west from the latter in the Bajda ta'Żejtun (260) and ta'Dwieħel (256) districts, there is a transition to the less specialised farming typical of the Eastern Region as a whole.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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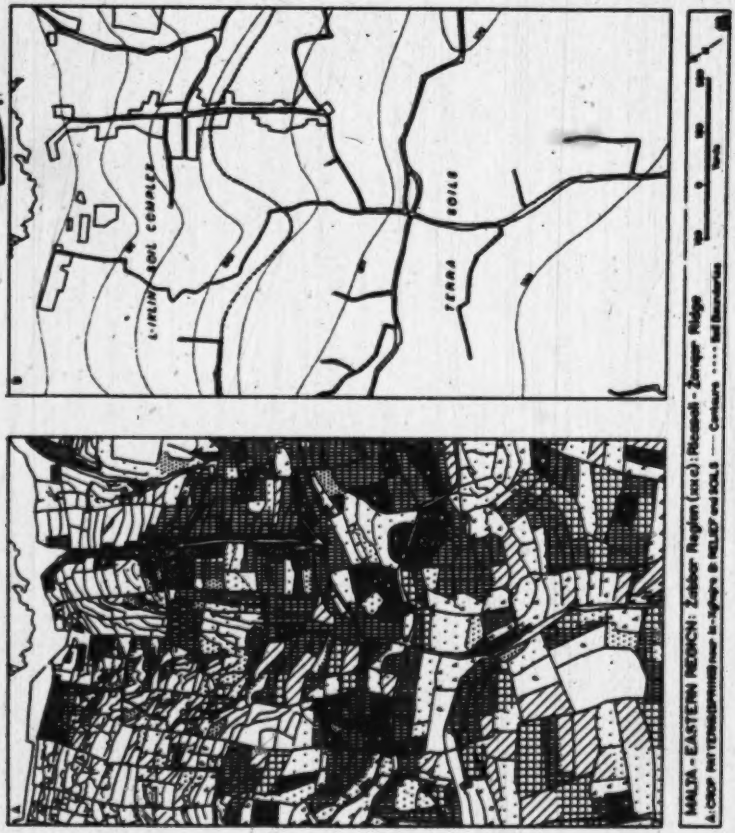

Fig. 133 Malta: Eastern Region: Żabbar Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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XX (d). THE MARSASKALA REGION

The twin promontories of Żonqor (254) and il-Gżira (264) flank the bay of Marsaskala and a Lower Coralline exposure incised by the Wieda il-Għajn (252) and is-Żiju (261). At Żonqor, exposure restricts the crop range to cereals and sulla, although some vegetables appear on the sheltered southern side of the ridge. Land abandonment is more extensive on il-Gżira, where erosion has already removed much of the thin red soil. Cultivation has retreated to the flanking lower land. The small spur of il-Bidni (253), standing between the two wieds marks the west-east transition between the Żabbar and Marsaskala Regions. Wasteland occupies its eastern slopes while, to the west, *qaragh baghli* and potatoes mark a change to more favourable conditions. The wieds themselves are uncultivated and abandonment has progressed some distance up the valley sides. 241* 311*

The primary function of Marsaskala is that of a fishing village and it is developing into a minor seaside resort rather than into a rural centre. [361]

XX (e). THE TAS-SILĠ—DELIMARA REGION (Fig. 124)

The crenulated peninsula of Delimara runs south from its broad isthmic base in the tas-Silġ hills. The whole of this area is exposed to the *Xlokk*. The eastward-dipping Globigerina beds cover Lower Coralline aquifers which are everywhere below sea level. Thus water for crops can only be drawn from rain-fed cisterns cut into the surface rocks.

In consequence of water shortage and exposure to humid sea winds there is very little potato cultivation. In the valleys opening on to the bay of San Tumas and on the ridge between tas-Silġ (277) and tal-Lombardi (278) are large fields of sulla and cereals, together with the minor fodders and legumes. The absence of permanent agricultural settlement and the restricted crop range appear surprising when compared with neighbouring areas, although cultivation is by no means of low standard.

Delimara peninsula, an asymmetrical north-south ridge, has a generally similar assemblage of crops in a restricted summit zone of cultivation. On the indented eastern coast, the many promontories between il-Munxar (MR. 614673) and Delimara Point have been affected by normal abandonment of difficult land and by the needs of the Defence Departments. A narrower band of wasteland marks the steep, concave western slopes. More open and sweeping slopes lie at the root of the peninsula below tas-Silġ and on a minor coastal plain to the east of Marsaxlokk fishponds sheltered conditions make possible a greater intensity of cultivation, the crops including potatoes and some early vegetables.

XX (f). THE BIRŻEBBUĠA REGION

Converging on Marsaxlokk Bay are a number of distinct physical and human sub-regions. The barren Wied ta'Marsaxlokk (276) is separated from Wied Dalam (274) by a low spur, on the higher slopes of which scattered farmsteads stand among gently terraced fields of mixed crops. Nearer the sea, on the promontory of ir-Ras (283), there is a good deal more uncultivated and non-agricultural land. Marsaxlokk itself has much the same limited range of functions as Marsaskala.

The Wieds Dalam (274) and Has-Saptan (285) form the only non-coastal region in the Eastlands with a rugged terrain of deep wied incision. On the interfluves, slow soil formation allows cultivation which, increasing in quality towards the west, concentrates on sulla, cereals, potatoes and minor legumes. Continued transporting of soil and silt from the wied channels to the upper terraces helps to maintain this rather low-grade form of land-use. The convex slopes running down to the valley floors are areas of rapid erosion and large-scale land abandonment. The wied floors in their upper sections are gentle depressions, part cultivated, part abandoned. Nick-points at heights of approximately 170 feet in Wied Dalam and 300 feet in Wied has-Saptan mark the heads of the incised, vertically-walled gorges in which Lower Coralline beds are exposed. Below the 50-foot contour, the stony, eroded channel with its covering of rough grass and weeds gives way to a zone of alluvial deposition. In the case of the Wied

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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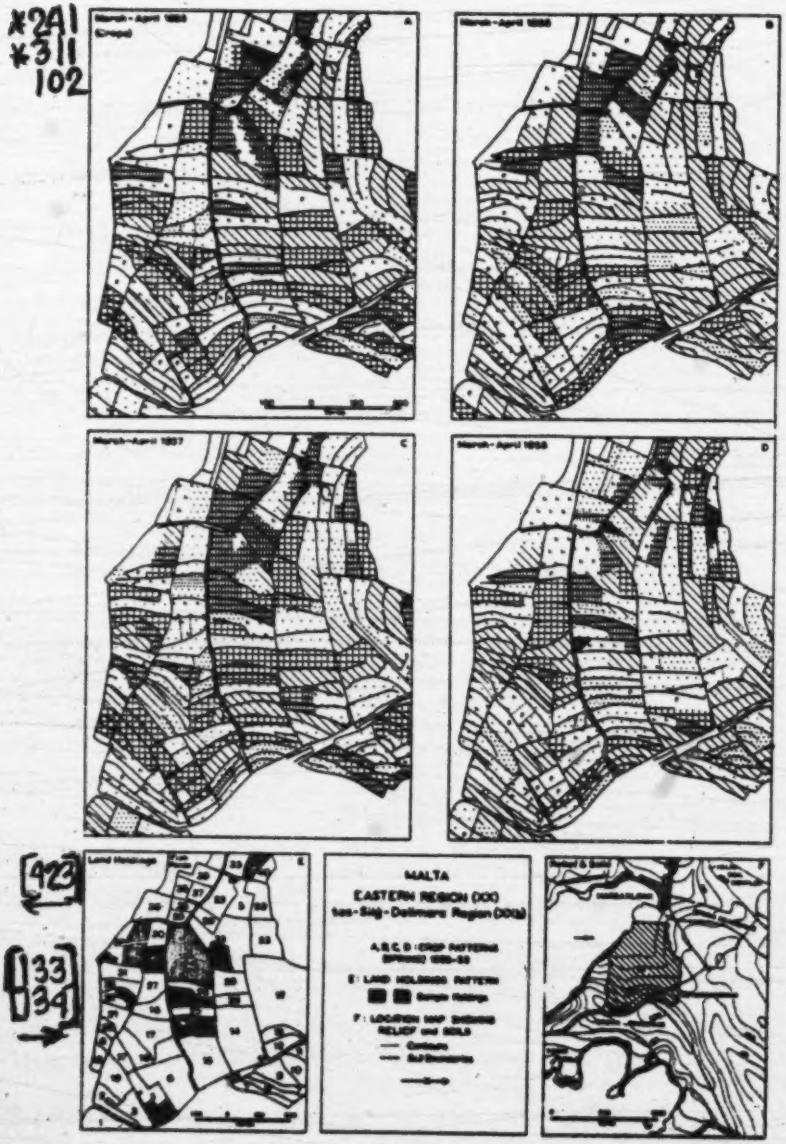

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33
34

Fig. 124 Malta: Eastern Region: tas-Silġ Delimara.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

Dalam, a good deal of this better land has been sterilised by the construction of a large pumping station, but a small pocket of intensive potato-growing occurs before the sea is reached. In the Wied Ras-Saptan, the transition is marked by a belt of marshy land carrying canes, bullrushes and grasses which are tended and 'cropped'. Below this lies a second small alluvial area also largely under potatoes. This district as a whole possesses a greater variety of physical and land-use conditions than any other in Eastern Malta. 24 * 31 *

From Qala San Gorg to Benghisa Point, a narrow coastal lowland has been completely taken out of cultivation by settlement growth and by commercial and military installations. The slopes behind this zone are traversed by a series of shallow wieds in which lie narrow strips of wasteland. All dry-farmed crops are represented in this hilly country, even to a few vines grown near the southern coast in a strangely exposed position.

In this small region is exemplified the major problem which besets the Maltese agricultural community and which complicates the patterns of land-use and farming practice in the island. New, well-surfaced roads serve Hal Far and Kalafrana, but between these arteries lies a neglected and relatively remote farming area. Distances involved are small, particularly when the attraction of non-rural life pulls people away from the land. However, as noted elsewhere, the same distances become exaggerated in their effect of isolating the country-dwellers who remain. The dichotomy of town and country is thus perpetuated. 369 491

GENERAL

The main facts underlying the regional differentiation of Maltese agriculture may be summarised as follows. While structure and topography control the general distribution of these cropping combinations, important regional differences result from variations in weather and micro-climate. Soil controls, in the main, coincide with those of structure and outcrop, but slope, as affecting removal and accumulation, together with the widespread traditional practice of transporting soil to artificial fields, break up the simple geological pattern. 24 * 31 *

Farming types in Malta must be identified against a background of socio-economic change. Commercial production is the rule, but considerable variations result from differing degrees of linkage with markets. Socially, this is paralleled by differences in the extent to which rural communities are affected by urban desires and emulations. Proximity to, or remoteness from town life are most important.

Wasteland is spreading most rapidly on the remote and physically hard lands. The flight from the land is slower where it is more productive. General deterioration is most widespread on lands of medium quality where the attraction of town life is strong. On the immediate fringes of the built-up areas, conditions are by no means uniform. While in some cases market gardening provides a particularly intensive form of land use, in others encroachment of roads and buildings produces a jumble of building sites, abandoned fields and a few surviving patches of cultivation. Around the main conurbation as delimited in Fig. 97, lie many pockets of true urban farming. In many of these, as in the case illustrated by Fig. 125, the jostling together of stock-yards and houses and fields, both abandoned and cropped, shows the town triumphant.

Agricultural Regions of Gozo

The physiographic divisions already indicated in Chapter 1 and shown in Fig. 4[1] are suitable for a regional analysis of agricultural practice in Gozo. Printed maps of Gozo bear few local place-names and thus it has been necessary to devise the special nomenclature used in the present section and illustrated in Fig. 76.[2] 24 * 31 * 102 104

[1] [See P. 38-A -- Analyst]
[2] [See P. 194 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
MALTA

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Fig. 125 Malta: Valletta Conurbation.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

I. THE WEST

The western regions are composed of an undulating Globigerina platform occasionally deeply incised and bounded on its seaward side by precipitous cliffs. 241 311

A narrow belt of wasteland fringes the coast and extends inland in the complex, faulted depression of Qawra (8), Wied Ilma (10) and Wied id-Dwejra (9). Minor blocks of abandonment also occur on the Upper Coralline mesa summits, as at Gordan (16), Ghammar (18) and Ghajn Abdul (12).

In the North-Western sub-region, the most intensive dry-farming is associated with the important village settlements of the Gharb - San Lawrenz plateau (7). Early potatoes, summer cotton and some viticulture differentiate this district from the remainder of the region. Further to the west, there is little difference to be observed between the crops grown in the shallow valleys of the Wieds il-Mielah (6) and ir-Raheb (2) and those on the higher lands of Birbuba (3). Il-Hotba tal-Qasam (1) (Fig. 126 C and D), remote and bleak, illustrates a general deterioration westward from the medium-grade dry farming typified by that near Santa Lučija (Fig. 126 A and B).

In the South-West, almost complete absence of settlement is associated with a crop range restricted to cereals, sulla and legumes. The promontory of Wardija (14) is the least intensively worked district.

The West as a whole is an epitome of dry farming. There is no irrigation and little watering of crops, and sulla, wheat and barley are vastly more important than all other crops. The clay slopes of the small mesas are almost entirely devoted to sulla, much of it self-seeded. Their coralline caps are too restricted in area to store any appreciable quantity of water and the clay soils are heavy and intractable. The retreat of cultivation from difficult and remote land is here marked by abandoned farmsteads as on the summit of Ghar Ilma (13). The coastland waste is not virgin karst but also exemplifies such degeneration.

II. THE WEST-CENTRAL REGION

This is a mixed region, both topographically and agriculturally, consisting as it does of open, wied-head basins, small mesas and the low Coralline platform on which Victoria stands, but it has a certain unity, based on the presence of the largest settlement in the island.

To the north and west of the town, in the Żebbuġ-Victoria and San Ġorġ districts (19 and 20), dry farming takes on a more intensive form than in the regions previously described. The several hamlets and small village settlements are associated with the growing of potatoes, brassicas, vines and even a little fruit, all of which however remain subsidiary to the predominant cereals and fodders. The land is well farmed and there is very little of the waste and low-grade fallow characteristic of parts of the West, although this does occur on the mesas as in the case of il-Ġelmus (21).

On the Victoria platform (23), the highest point of which is crowned by the Citadel, more intensive land use results from urban demands. Farmhouses, stock-yards and walled gardens carrying a great variety of crops form a southern, rural fringe to an otherwise essentially urban settlement. Kerċem has retained its village character in spite of, or possibly because of its close proximity to Victoria. [36]

The Wied tal-Lunzjata (25) (Fig. 130B) possesses some interesting agricultural characteristics, which derive from an especial combination of factors. Between the low Upper Coralline scarps which mark the edge of the central platform and above the incision of the Wied ix-Xiendi (70), where Lower Coralline rocks are exposed, is a spring-watered zone developed on clay and marled Globigerina. Below Ghajn il-Kbir (M.R. 313884: «the great spring) are small irrigated plots of vegetables and fruit. Away from this small pocket, cultivation deteriorates rapidly into the wasteland of Wied ix-Xiendi.

III. THE NORTHERN REGION

In this, the largest region of Gozo, unity is provided by the repetition of a few simple landscape elements. As noted in Chapter I.B, these comprise the

[Text continues on p. 277]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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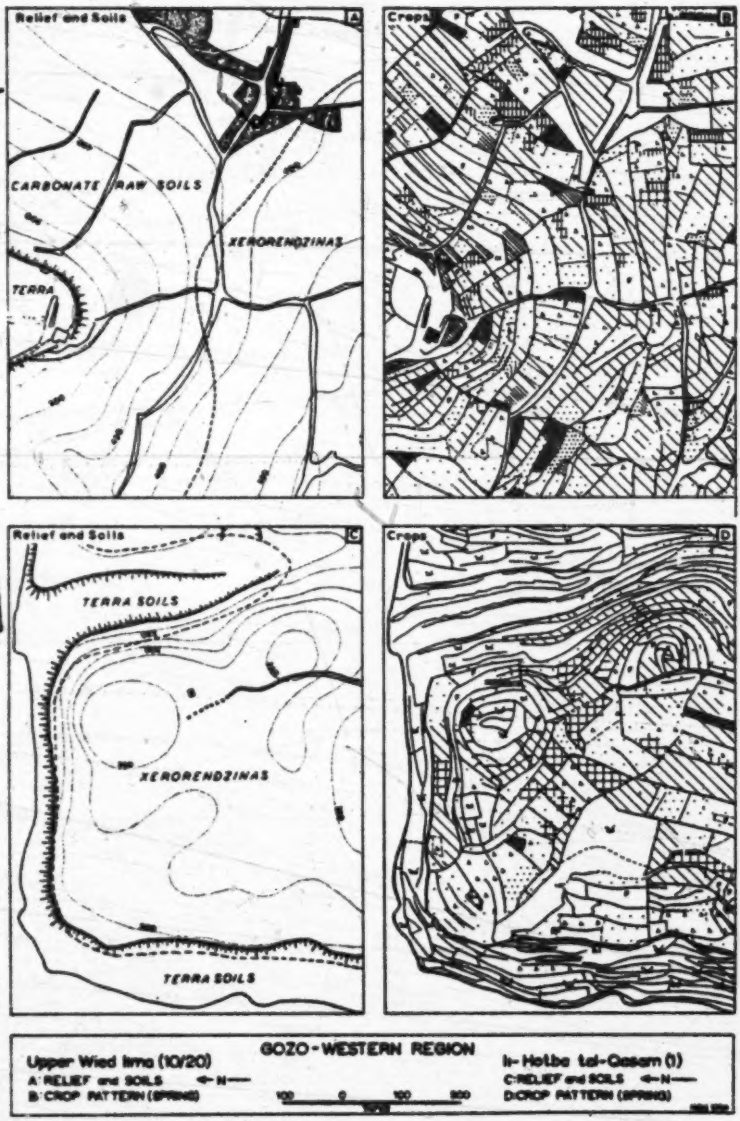

Fig. 126 Gozo: Western Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
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high Upper Coralline platforms, the sweeping Blue Clay slopes and, in the larger valleys, Globigerina beds, generally covered by down-washed material. Variations in the arrangement of these elements are reflected in important differences between the several sub-regions. 29|* 31|*

Żebbuġ, the most compact of the larger mesas, is flanked by the Wied il-Għasri (26) (Fig. 128A) and the Wied tal-Qlejgħa (29) on the west and east respectively. Immediately below a peripheral cliff on which stand lines of farmhouses, lies a *ġnien* zone of inter-cultivated fruit and vines. The Upper Coralline cap, unlike those of the smaller western mesas, is sufficiently extensive to hold a small perched water body. The demands of the settlement, however, restrict the quantity of water available for irrigation, this in part accounting for the narrowness of the *ġnien* belt. On the northern coastal slopes (28), such intensive cultivation survives precariously in defiance of exposure to violent northerly winds and sea spray. Some abandoned fields and farmhouses show that retreat is in progress.

On either side of the mesa, a similar gradation from *ġnien* zone to valley floor may be observed (Fig. 127 C and D). On both the higher Blue Clay slopes and the marled areas below, the crop range of vines, sulla and cereals, with some potatoes, indicates a productive type of dry farming common to all the valley slopes of the Northern region. These ramped fields on open, sweeping slopes, carrying good crops but, devoid of settlement, constitute the most widespread type of rural landscape in Gozo. It is the relatively limited development of this landscape in Malta which provides the most striking contrast between the two islands.

The restricted wied floors and the small size of their catchment areas militate against any development of irrigation. The lowest slopes are thus less intensively worked than those rising to Żebbuġ. The interfluves to the west of the Wied il-Għasri and east of Wied tal-Qlejgħa are marked by a discontinuous line of small mesas with waterless clay slopes. Dry farming laps over the low ridges to grade westward into still poorer land use and eastward into the more diversified Wied ta'Marsalforn (35).

In the latter valley, while the main clay and downwash slopes are similar in character to those of the Wied tal-Qlejgħa, the more open valley is different. Towards the wied mouth there is a small alluvial lowland of good, stoneless soils, largely devoted to the growing of potatoes. Irrigation by water pumped from a small sea-level water body at the moment supports this higher intensity of cultivation, although increasing salinity, which already affects the water supply of Marsalforn itself, inevitably limits possibilities in this district.

The small settlement of Marsalforn is still primarily a fishing village but, like Marsaskala in Malta, is developing into a minor sea-side resort. Resulting improvements in communications have not as yet affected the pattern of farming. [36]

Further upstream, there is a slight lowering of farming intensity in the valley. Vines are most important in the centre of the depression while potatoes are most concentrated along the road to Victoria. Although the topographic map shows the Wied ta'Marsalforn opening out on to a low col north-east of Victoria, a fault-line, marked by a low cliff of upthrown Lower Coralline, clearly defines the southern limit of wied-type cultivation. Along this line, the effects of urban settlement on land use become apparent and there is also a sudden transition to the different field patterns and crop assemblage of the Central Plain.

On the eastern side of the Wied ta'Marsalforn, the ramped slopes of sulla, cereals and vines pass into embayments in the edge of the Xagħra Plateau (36). Around the tiny urban nucleus of Xagħra itself are clusters of farms, beyond which farmsteads are strung out in long lines along tracks and roads and around the plateau edge. The thin, red, stony soil of the plateau supports a scatter of cultivated fields. Some of these are intensively worked gardens, others carry patch cultivation of poor cereals, vegetables and fruits, while many are now waste. To the north, density of settlement and intensity of farming diminish on the exposed *qortin* lands, the Qortin ta'Għajn Damma (37) being completely waste. The remote *rdum* areas are completely covered by sulla, much of it self-sown (Fig. 128C). The neglect of such undercliff areas which, in Malta, [36]

[Text Continues on P. 279]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
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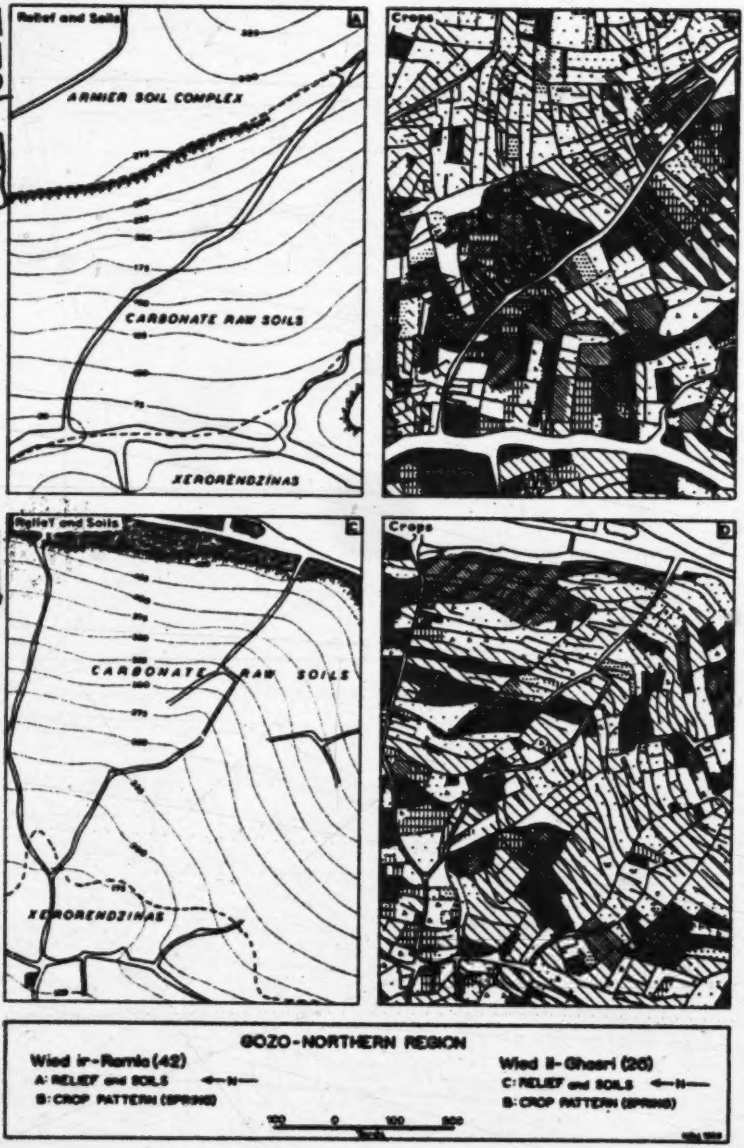

Fig. 127 Gozo: Northern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
GOZO

are among the most intensively worked, reflects the lower intensity of pressure on land in Gozo. 24 1*

Topographically, the Wied ir-Ramla (42) (Fig. 128B) is similar in type to the Wied ta'Marsalforn. The wied channel becomes progressively more sharply incised downstream before opening out into the sandy, bay-head lowland (from which the valley takes its name: *Ramla* = sands). Tributary wied embayments cut into the Coralline plateaus on either side. 31 1*

Below the mesa scarps there are the usual *ġnien* zones and these give way downhill to a belt of sulla and cereals on the heavier, drier parts of the Blue Clay outcrop. On the eastern slopes lying below the Qortin tan-Nadur (48), recent and Quaternary sands, whose presence is marked by light, ochre-coloured soils, occurs a specialised zone of early tomato and cucurbit production and viticulture (Fig. 127 A and B). This relatively intensive pattern of land use extends from the scarp on to the eastern half of the lower valley floor. On the remainder of the main valley floor, mixed cultivation in which vines and sulla predominate is diversified by relatively large scale potato-growing and some fruit production. The floors of the tributary wieds il-Ggantija (43) and il-Hanaq (44) are characterised by particularly intensive viticulture which merges into flanking zones of cereals and sulla. The small mesa of in-Nuffara (45) has similar characteristics to those of the western Coralline fragments.

The remaining part of the Northern Region is closely associated with the village of Nadur. The plateau on which the latter stands (46) is composed of a series of flat-topped promontories (*Qortin*) which run north and north-eastward from the main ridge. These overlook the coast in a series of *Rdum* slopes and are separated by deeply incised wieds. The arrangement of physical features is reflected in the lay-out of settlement and communications. As in the case of Xaghra, a small urban nucleus gives way northwards to strings of farmsteads aligned along roads and tracks. The plateau top thus contrasts with the valleys, which have virtually no permanent settlement. 31 1* 36 [133]

Land use on the main plateau ridge is semi-urban in character with gardens and stockyards. The *qortin* lands, though physically uniform, differ a good deal from each other in land utilisation. The higher southerly part of the Qortin tan-Nadur (48) is largely waste, but the lower northern bluff is remarkably well cultivated under cereals and sulla with occasional small plots of vegetables and vines. The two promontories of the Qortin il-Kbir (51), on the other hand, form the most extensive areas of karst wasteland in the whole Northern Region of Gozo. Similar contrasts exist between the two rdum areas lying below the *qortin* lands. The Rdum tan-Nadur bears a scatter of small enclosures of vegetables, fruit and minor crops. In this case, cultivation is similar in type, though not in intensity, to that of the Maltese 'undercliff' areas. The Rdum tal-Mistra (53), by contrast, is a rugged wasteland, the greater part of which has never been cultivated. 24 1* 31 1*

Piercing the plateau on its northern side are three deep and sheltered valleys: Wied San Blas (50), Wied tal-Mistra (52) and Wied Dahlet Qorrot (54). These are characterised by the virtual absence of the common dry-farmed crops, which are replaced by a remarkably complex inter-cultivation pattern of fruit, vegetables and vines. This is the only area in Gozo completely devoted to intensive market gardening, the products of which are sold in Malta. The growing demand for early produce has resulted in the recent and continuing extension of the area under fruit and has encouraged experiments such as that of strawberry growing. The difficulties of transporting produce out of these deep valleys is offset by the advantage of proximity to the harbour of Mġarr. Thus the *ġnien* type of farming typical of plateau peripheries has here been extended downhill to the valley floors. [133] [489]

IV. THE EASTERN REGION

This comprises the Qala Uplands (55) and flanking coastlands (56) together with the narrow coastal strip which separates the East Central Region from the sea. Structure, topography and land use alike distinguish the Eastern Region from its neighbours. As a result of faulting, the pattern of rock outcrop is often

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1: Bowen-Jones et al. K-5 (1955-1958) 1961

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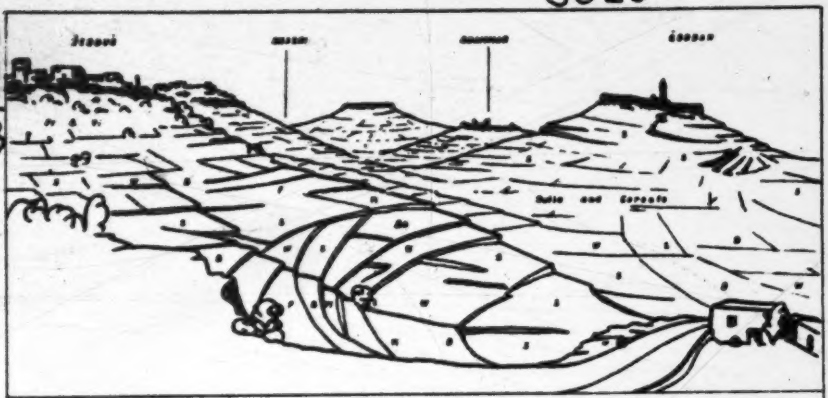
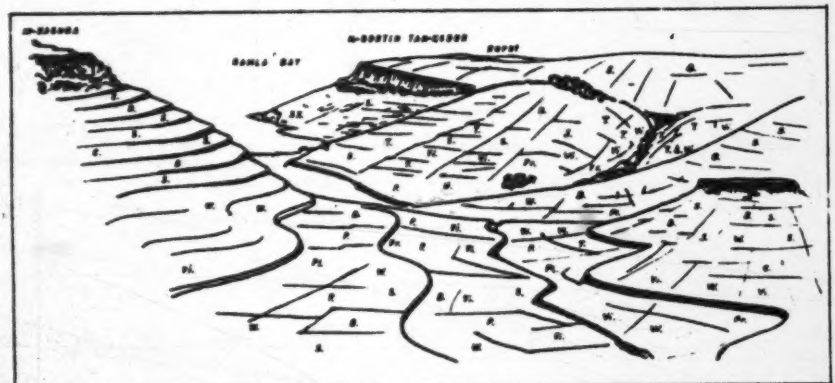
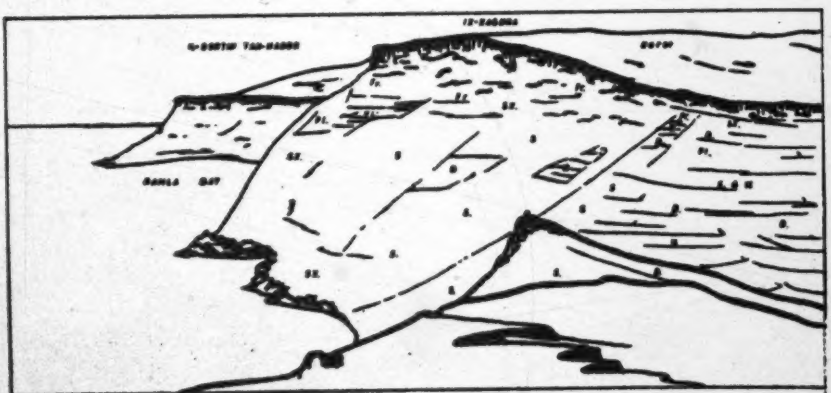


A: Wied il-Ghasri (26) PT. OF OBSERVATION M.R. 307930 VIEW S.



B: Wied in-Ramla (42) PT. OF OBSERVATION M.R. 350897 VIEW N.E.



C: Rdum tax-Xaghra (41) PT. OF OBSERVATION M.R. 343915 VIEW S.E.

[p. 280]

Fig. 128 Gozo: Northern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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confused and seldom bears any simple relation to topography. In this region, many minor factors of soil, aspect and water supply produce local variations in the landscape, human as well as physical (Fig. 129 A, B and C).

Around the village of Qala, the upland is generally poorly cultivated. Fields of cereals and sulla are interspersed with abandoned areas and karst patches. On the Qala coastlands to the east the pattern of cultivation is clearly related to the successive outcropping of the various rock formations which are here, in contrast to the rest of the region, quite simply arranged (Fig. 129 D and E). The whole sequence from Upper Coralline to Lower is displayed in this district but there are few well marked breaks of slope, the whole forming a single slope from 400 feet to sea level. Immediately below the Upper Coralline summits, vines and fruit trees occur on the Blue Clay. Nearer the sea, a band of Globigerina is largely under cereals, sulla and legumes, this being succeeded by Lower Coralline wasteland fringing the coast.

The complex structure of the lands to the south of Qala is reflected in broken topography and a great variety of outcrop. South facing valleys in which the Blue Clay is exposed give way on their seaward side to a fragmentary platform developed on Globigerina and Lower Coralline limestones. The distribution of wasteland is closely associated with the outcrops of the latter formation. With the exception of the upper Wied tal-Qala (58), where good, well watered soils carry fruit, this district is one in which small enclosures of the whole dry crop assemblage lie among rocky hill wastes. Standards of cultivation in this somewhat inaccessible part of the island are generally low and abandonment is proceeding. By contrast, the slopes above Mgarr Bay, extending eastwards to include ta'Zewwieqa (60) are, on the whole, more intensively worked. In this steeply sloping area, unusually small enclosures have been established for the cultivation of fruit and tomatoes, while somewhat larger fields carry cereals and sulla. These patches of cultivation alternate with barren scree slopes. In the immediate vicinity of Mgarr (61), ill-tended minor tree crops such as carobs, figs and olives give a spurious impression of luxuriance. Mgarr itself is a fishing harbour and commercial port. In its latter capacity it belongs to Gozo as a whole rather to its immediate hinterland and through it passes all the trade between the two islands. Port facilities are limited and have acted as a brake on the commercial development of Gozo. Mgarr has little or no agricultural function and is overshadowed in size by its immediate neighbour, the farming village of Ghajnsielem. South of Mgarr, below Fort Chambray, the Rdum it-Tafal (62) is a typical Gozitan undercliff area with small enclosures, all rather ill developed, which carry some tomatoes, potatoes and fruit crops, among which there are numerous islands of rocky, carob-clad wasteland. [504]

V. THE SOUTHERN REGION (Fig. 130)

The only unity possessed by this region is a result of its structural and topographical separation from the interior. The il-Hobz Coastlands (63) lie below a well-marked Upper Coralline scarp and are separated by the Wied Mgarr ix-Xini (64) from the Sannat and ta'Cenc Uplands (67 and 66). The latter are an upthrown block of Globigerina and Lower Coralline Limestone, the northern edge of which is a clearly defined, interior-facing fault-line scarp, in the extreme west, the sharp incision of the Wied ix-Xlendi (70) divides the Southern Region from the Globigerina platforms of the west. [133]

At il-Hobz (63) the karst edge of a low Upper Coralline cliff overlooks gentle slopes developed on Blue Clay and Globigerina. A narrow belt of spring-line fruit growing is succeeded downhill by open terraces and larger fields of cereals, sulla and other 'dry' crops. Much of the land is spring-tilled in preparation for summer vegetables. The seaward limit of these shelving slopes is marked by a break of slope below which lies a low Globigerina rock platform.

This simplicity of landform is abruptly terminated on the west by the fault-guided incision of the Wied Mgarr ix-Xini (64). Below the pumping station, steep slopes and exposure of the compact Lower Coralline beds have prevented cultivation. Coinciding with an upthrown block of the same rock type, wasteland extends into the lower Wied Hanżira and over the neighbouring, gentle slopes.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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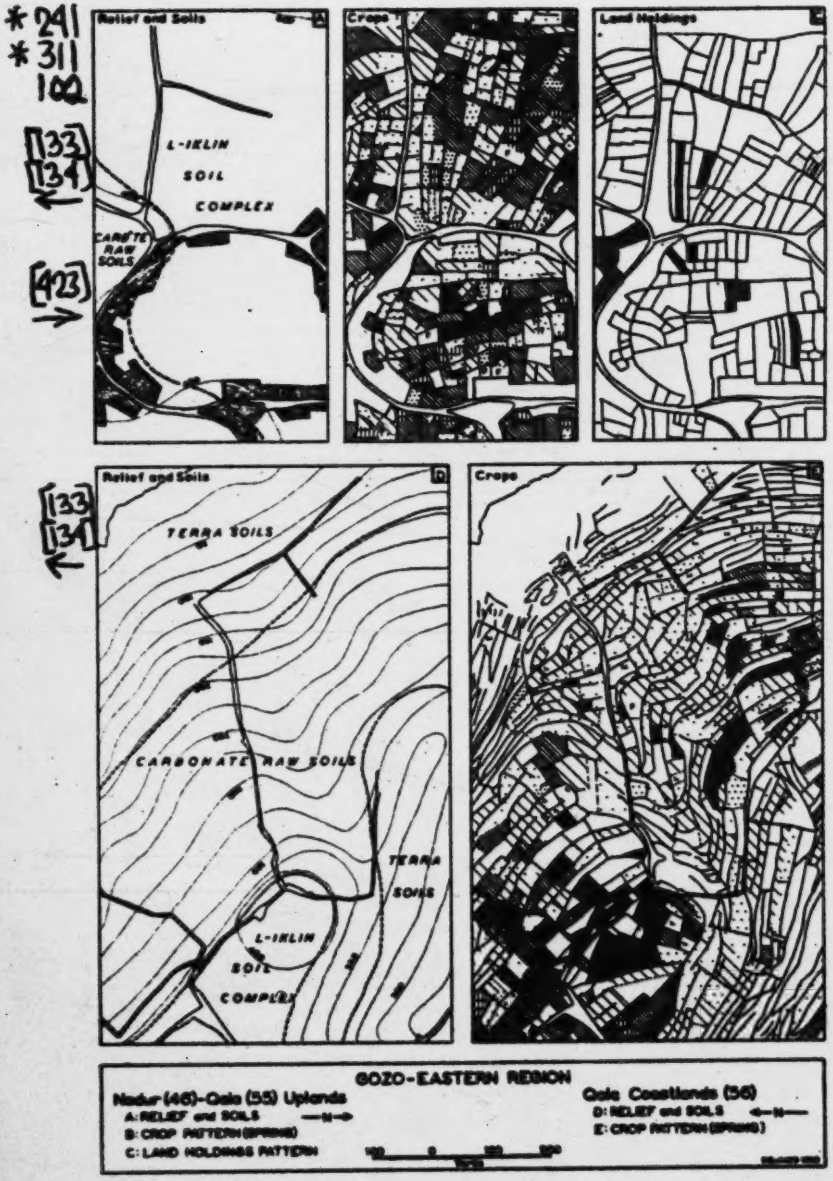

Fig. 129 Gozo: Eastern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

The intractibility of the Lower Coralline rocks, a function of the extreme slowness with which they are attacked by the forces of weathering, is repeated on the ta'Cenċ Upland (66). Most striking is the contrast with cultivated outliers of the softer Globigerina beds. Thus it is the spurs on either side of the Wied is-Sabbar (65) rather than the valley itself which are cultivated, mainly under cereals and sulla (Fig. 130A). At ta'Cenċ, grey karst hills overlook the sea and contrast strikingly with the scarp foot basin to the interior. 24 * 31 *

The Sannat Uplands (67), also tectonically elevated, have retained a cover of Globigerina rocks and here cultivated fields extend to the edge of the high sea-cliff. South of Sannat village, these fields are geometrically laid out and are to be associated with enclosure accompanying the westward extension of village settlement on to the hills. A similar crop assemblage is to be found both here and in the less regular fields of the broken land to the west. These are districts of dry farming, cereals, sulla and legumes being the chief crops. In spring, following winter cropping and in preparation for some summer vegetable cultivation, many of the fields are newly tilled. A high water table is maintained in the shallow Globigerina beds by the underlying massive and relatively impervious Lower Coralline.

The western extremity of the Southern Region is marked by a return to barrenness. Incision along a shatterbelt exposes Lower Coralline rocks in the Wied ix-Xlendi (70) and the tributary wieds Munxar and tal-Bardan (69). Karst, usable only for *xagħra* grazing, is but rarely broken by patch cultivation. The compact agricultural village of Munxar is divided by a Coralline gorge, at the head of which lie dense thickets of neglected trees. Above the small fishing village of Xlendi there is a small alluvial pocket devoted almost entirely to legumes. These two small patches are exceptional in an otherwise rocky wasteland area.

VI. THE EAST CENTRAL REGION

This region, as viewed from the surrounding hills, appears as a single basin. In fact, a central ridge separates two main depressions, a topographic division strengthened by the east-west alignment of a fault zone. The southern depression, that of the Wied Ħanżira (73), is bounded to the north by a minor cliff with a narrow exposure of Lower Coralline rocks. The Xewkija-Għajnsielem Ridge (71) is in turn demarcated on its northern side by a sharp break of slope coinciding with a resistant bed in the Globigerina. This latitudinal graining of the land becomes blurred between Xewkija and Victoria, where the Victoria-Mġarr Depression (72) swings southward to merge with that of the Wied Ħanżira. These regional subdivisions and their topographic characteristics are reflected in the field patterns (Figs. 131 and 132). [33]

The sub-region identified as the Wied Ħanżira Depression (73) includes the basin of the upper wied and the shelf which extends eastwards at the same level to Għajnsielem. In the west, between Sannat and Xewkija, lies a symmetrical, open basin of intensive dry farming. As shown in Fig. 131 A and B, there is a fairly regular arrangement of large but subdivided field. On the deep soils are grown a great variety of crops among which vines, cereals and sulla predominate. On the eastern shelf, the proportion of cultivated land diminishes, vines disappear and there is a great deal of fallow and grazing land. This change in crop assemblage is not associated with any topographic break but with a change in soil type and parent rock across a major fault. (See p. 31 and Fig. 2.) The only enrichment of the crop range which appears to result is seen in the greater importance of potatoes and onions. This may also result in part from the nearness of Għajnsielem and proximity to the main Mġarr highway.

On the central ridge, the poorest cultivation and the thinnest, least continuous soil cover are found at the western end and along the Lower Coralline exposure south-west of Xewkija. In general pattern, this village resembles the hill-top settlements of the North, with its farmsteads and gardens strung along a web of roads and tracks. South-east and east of the village, the ridge top is characterised by geometrically arranged, undivided fields, the largest seen in Gozo. Cereals, sulla and vines, grown in exceptionally large blocks, are the typical [34]

[Text continues on p. 287]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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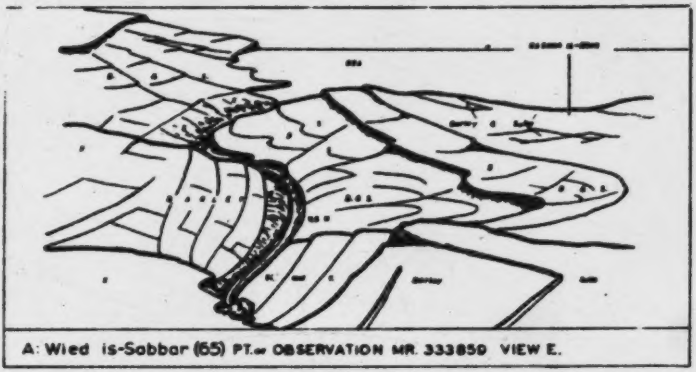

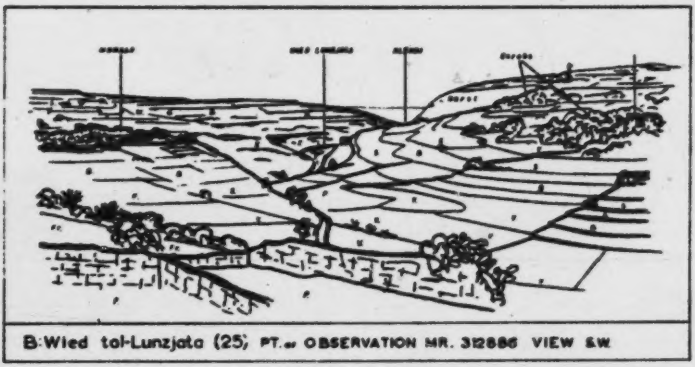

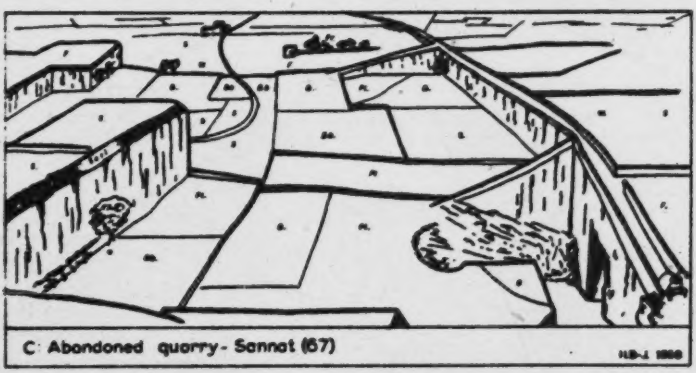

Fig. 130 Gozo: Southern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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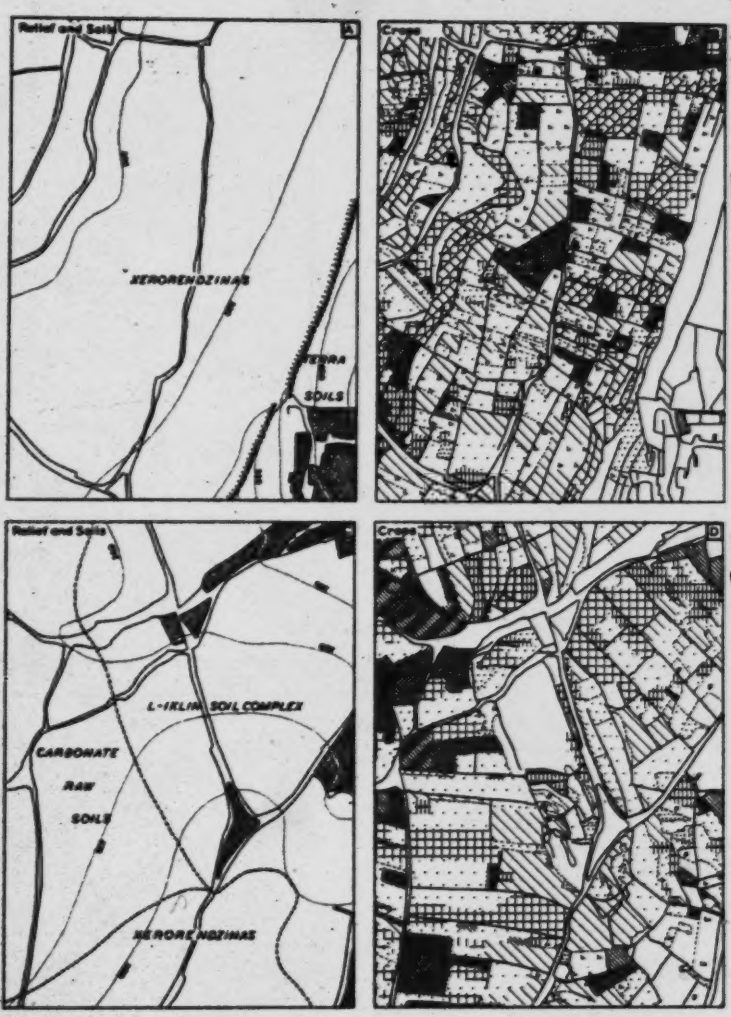

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GOZO EAST-CENTRAL REGION

Wied Hanżira Depression (73)
Northern Outskirts of Sannat
A: RELIEF and SOILS ←N—
B: CROP PATTERN (SPRING)

Xewkija-Ghajnsielem Ridge (71)
Northern Outskirts of Ghajnsielem
A: RELIEF and SOILS ←N—
B: CROP PATTERN (SPRING)

100 0 100 200 300 Yards

Fig. 131 Gozo: East-Central Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

Fig. 132 Gozo: East-Central Region: Xewkija-Ghajnsielem Ridge.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
GOZO

crops of this dry-farmed area. A striking contrast is formed by the field patterns of the level area immediately north of Xewkija at il-Hamrija (Fig. 132), where the equally large fields are minutely subdivided into long, extremely narrow strip holdings. In spite of this contrast, the crop assemblage is much the same. Here, as elsewhere in the Islands, such differences in the man-made landscape can only be interpreted by a full investigation of land ownership and the evolution of tenures. Field investigation suggests that there is no valid ecological reason for such fragmentation.

The Victoria-Mgarr Depression (72) is the largest area of level land in Gozo. There is practically no permanent settlement in this sheltered zone of deep soils, though intensity of cultivation is everywhere high. Here again, large level fields are divided into minute strips. All the more important crops are represented in this area of high grade dry farming (Fig. 131 C and D). The viticultural standards are particularly high, the vines being better tended than in practically all other areas of the Maltese Islands.

Ghajnsielem village lies at the eastern junction of the three major units of the East Central Region and stands above the lower lands of the Wieds Mgarr (74) and Biljan (75) which converge on Mgarr Bay. The elongated settlement of Ghajnsielem itself is primarily an agricultural centre, consisting of a loosely-knit agglomeration of farmhouses. Along the roads, however, there are numerous small workshops and contractors' yards. These have appeared in response to the growing importance of traffic along the arteries which link the centre of the island with its only port. Here may be observed one of the inevitable results of economic progress, analogous in type to the much bigger development at Qormi in Malta. Eastwards, in the sheltered hollows of the Wied tal-Mgarr (74) and the Wied Biljan (75) specialised fruit growing predominates, although a full range of crops is to be found.

GENERAL

In Gozo there exists the same range of agricultural regions and crops as may be found in Malta, but the balance of importance is very different. The few areas of absolute waste are small and scattered and are confined almost entirely to outcrops of Lower Coralline rocks, while the Upper Coralline exposures are, with few exceptions, either built over or quite intensively worked. The defensive or refuge character of old settlement in Gozo has been mainly responsible for the agricultural exploitation of the Upper Coralline plateau tops which in Malta are often neglected. Retreat from such areas has been slower than in Malta, first because the presence of villages 'anchors' the farmers to their vicinity and secondly because of the lack of alternatives to the rural way of life in the predominantly agricultural Gozitan economy. On the other hand, the difficulties of export and the absence of large urban markets militate against commercial specialisation on the scale found in the most intensively farmed parts of Malta. Physical factors have also inhibited such development in that irrigation in Gozo is generally a matter of the utilisation of spring-line water and there are no known water bodies capable of easy exploitation such as that of the Maltese Wied tal-Pwales. Such specialisation as does exist is for the most part of recent origin and is based on the climatic advantage of early fruit and vegetable production. In the virtual absence of extremes, the Gozitan norm is good quality dry farming in its various forms.

CONCLUSION

The regional variations in farming landscape which may be observed in the Maltese Islands and are here described are significant in two main respects. In the first place they indicate the nature of the general forces which influence rural life. The fact that the lowest farming standards and most restricted crop assemblages are found in the remote as well as in the physically difficult areas emphasises how, even over small absolute distances, degrees of isolation and

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

*24 *31 communication can determine the quality of resource use. Similarly, the consequences of differences in pressure on land resources are clearly demonstrated in the regional variations in the intensity of use of intrinsically similar land.

Even more important, the distinctive character possessed by each of the regions described shows how the physical environment is variously assessed by the Islands' farmers. This is finally the question which matters: how far is Maltese life, not only in the rural sector, dominated by sometimes rigid, sometimes anachronistic perception of possibilities? It is to a consideration of this theme that our study now turns.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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[P. 289]

Chapter IX

A. The Maltese Farmholding

For our purposes here we shall define a 'farmer' as 'the owner or holder of land which he cultivates', but will add the limiting clause, 'as the principal person of an agricultural enterprise'. There may be joint owners or holders but normally, even where a *'communio inter fratres'* has been established on the death of a parent landholder, one person will assume responsibility for the control of the enterprise. He is the farmer. His brothers, sisters, wife and children, if they assist in working the land, together with the non-family labour which he may employ are the farmworkers. The inter-relationships of family and work can, however, be much more complex than this simplification may imply. 423* 241 [464]

The land worked by the farmer and his group of helpers we shall term the 'farm holding' or 'farm'. 'Holding' here implies simply the land held by the farmer, and is not used in a synonomous sense with the legalistic 'tenement'. There are excellent reasons for maintaining a clear distinction between the two terms for, on the one hand, a holding may consist of many different tenements held by the farmer of as many landowners, and, on the other, a legal tenement may be occupied by more than one farmer. Confusion may also arise, in this connection, from the fact that a holding may contain freehold, as well as various types of leasehold land. Within each holding there exists a loosely-knit collection of plots, which, through accident or design, have come to be in the occupation of one individual or group. Because of the geograp[illegible]al isolation of the plots, most of the holdings might, descriptively, be termed 'fragmented holdings'. Such holdings need not necessarily have acquired this characteristic through the process of *parcellement*; that is by splitting up of a holding into a number of non-contiguous plots. No generic connotation, therefore, should be attached to the purely descriptive use of the term 'fragmented'. In the following examination of the Maltese farm, this distinction between descriptive statements and analyses of processes will be maintained. 423*

The physical size of a farm may be considered as the total area of land over which the farmer exercises sole rights of occupation for agricultural purposes. Fortunately, in the Maltese Islands, the matter is not complicated by problems of definition concerned with common land, as communal holding of land is effectively absent. But other problems do arise, since land is so variable in quality, ranging from fertile irrigated lands to soil-less karst, with many gradations in between. Most farms include land of more than one category and, especially in the north and west of Malta and the hard-rock areas of Gozo, many farmers hold rights over waste-land which from the cultivator's point of view is useless.

The average size of farms has proved an elusive statistic for many writers. A figure of 3.7 acres was given to the Royal Commission of 1911-12. From 1921-36 the Blue Books continued to advertise the patent fallacy that only 236 holdings were in the 0-10 acre size range and that 10,864 holdings contained from 11-50 acres of land. However, in this context any average figure is very largely meaningless except for purely comparative purposes. The range is enormous; holdings less than 1 *tomna* are not considered as farms, but there are many holdings only slightly larger than this, while at the other end of the scale, farms of 300 *tmien* are not unknown.

Much of the record concerning farm sizes is incomplete and, although the present response rate of over 97 per cent. to the annual Agricultural Census conducted by the Central Office of Statistics is excellent under the conditions prevailing in the Maltese Islands, it seems probable that earlier returns lagged far behind in this respect. Of the various sources, the Farm Register is probably the most accurate. It began with a Census in 1943 and was checked against another in 1944; for several years its details were consolidated by field survey. 423* 129 659

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1:Bowen-Jones et al. K-5 (1955-1958) 1961
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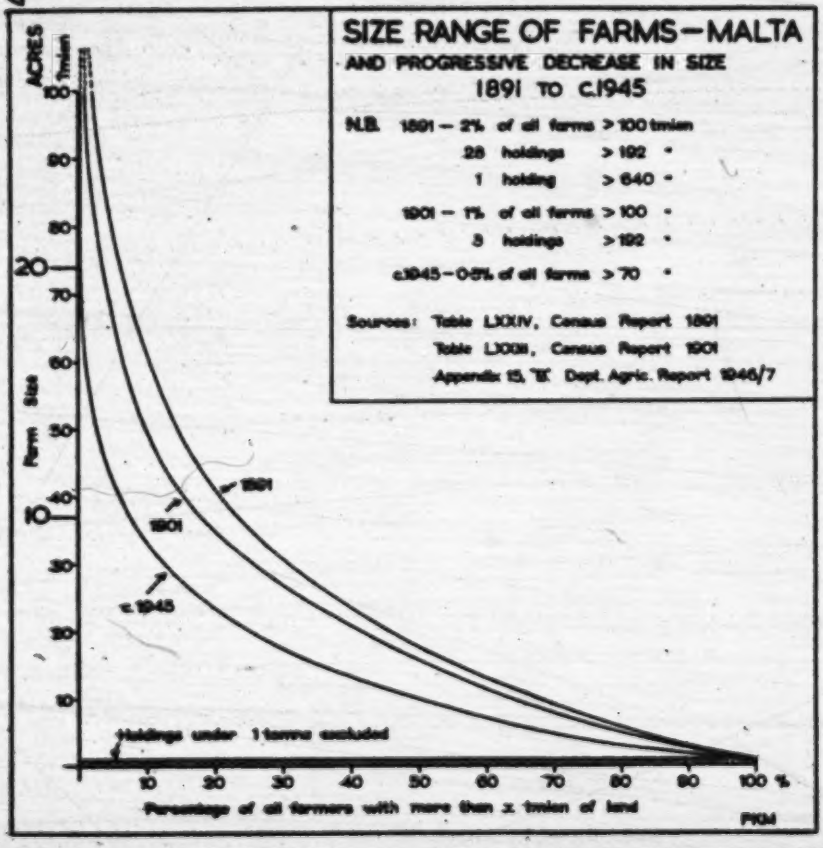

[p. 290-A]

Fig. 133
Size Range of Farms: Malta.

1:Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
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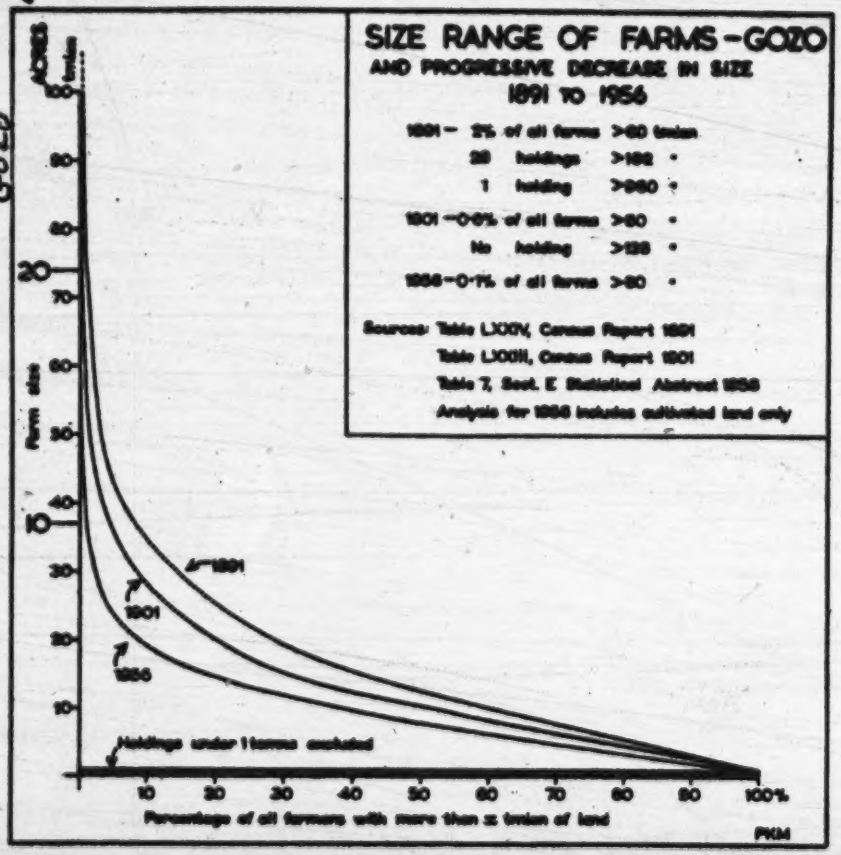

[p. 290-B]

Fig. 134
Size Range of Farms: Gozo.

I: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

and a small staff is still retained to endeavour to keep its material up to date.

Quite apart from the varying accuracy of the censuses (and it is almost impossible to assess the accuracy of the earlier ones), the analyst is faced with other internal problems. In connection with the size of farms and the types of land within them, different criteria have been used at different times: in 1891 and 1901, land was classed as cultivated and uncultivable; in the Farm Register, irrigated, semi-irrigated, dry- and tree-covered land are classed as cultivated and the balance as waste; the surveys of 1951-56 specify dry, irrigated and idle land, together with waste. How far these groups are comparable from period to period it is difficult to say. The 1956 Abstract provides a better picture, for here in addition to the analyses of dry and irrigated land considered separately, there is also a simple size analysis of holdings according to the amount of dry and irrigated land taken together. More closely comparable with the earlier analyses it is yet not identical, since wasteland and, presumably, idle land are omitted. The full significance of the size characteristics of Maltese farms emerges only when the relative proportions of the two classes of land, dry and irrigable, are studied. This material is presented later, in Table 38. However, useful preliminary points can be made on the basis of the earlier, simple size-range tabulations.

The size-range data are presented in Figs. 133 and 134 and relating to Malta and Gozo respectively; they are directly comparable except for the 1956 curve in the Gozo diagram which relates to cultivated land only. However it is unlikely that this discrepancy will seriously upset the validity of the diagram as a whole. A 1956 curve for Malta, based on similar figures, differs only in detail from that produced here for the period c. 1945.

The content of these diagrams is largely self-explanatory: each curve illustrating the number of holdings above or below certain critical size limits. In Malta, in the year 1891, almost 80 per cent. of all holdings were smaller than 40 *tmien*. Also in that year the median figure was 18 *tmien*.(5 acres) in Malta but 13 *tmien* (3¼ acres) in Gozo. Farms were already smaller in both islands by 1901 and, at the end of World War II, Maltese farms had become smaller than were the farms of Gozo 55 years earlier. In 1966, the median figure for Gozo stood at the very low level of 8 *tmien* (2¼ acres). When it is realised that, for all except Gozo 1956, these data include some 5-7 per cent. uncultivated land, a major problem in Maltese agriculture has been outlined.

It might be held that the decrease in the size of holdings simply reflects a general reduction in the farmed area as a result of urban expansion. However, later evidence will show that the process of *morcellement* has probably been continuous for at least 100 years, and it is uncertain whether, over this longer period, there has been a net increase or decrease in the area of agricultural land. Certainly, in the period 1850-80 large areas of wasteland, mainly Government Land, were let on long improvement leases. Although it is clear that some of this land, for various reasons, never became productive, and yet more has remained marginal in character, a quantity unknown has been permanently added to the cultivated area of the island.

However, from Figs. 133 and 134, it is clear that the reduction in the average size of the farm has taken place at all levels: large farms have become two or more smaller farms, while smaller farms have been reduced in size. The process is thus an integral part of local agricultural development: small farm units are not merely the product of external encroachment, which, by reducing the area of agricultural land also reduces the average farm size (assuming a constant farm population). The extension of non-agricultural uses is obviously a factor to be considered, but the total farm population has not remained constant; indeed, despite considerable emigration and movement to the towns, it has increased (Chapter VI A). The precise number of holdings at any one time is not readily ascertainable, as most records are known to be incomplete and there is no means of knowing how many farmers failed to make returns. However, the following Table 34 indicates the general trend:-

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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Table 34. Number of farm holdings.

	Malta	Gozo	Malta and Gozo
1891	6,307	2,965	9,272
1901	6,106	3,072	9,178
1950	9,600	4,000	13,600
1952	9,440	3,815	13,255
1955	9,011	3,674	12,690
1958	8,774	3,441	12,215

The fluctuations during the post-war period are not considered to be significant, since the 1950 figure was an estimate, and something like 750 farmers are known not to have co-operated in 1955.

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Some further indication of the long-term increase in the number of holdings is given by the Census statistics of Agricultural Occupations for the years 1842-1931. In those years, persons working on the land were grouped in the following categories:-

Table 35.

	1842	1851	1861		1871	1881	1891 1901 1911 1921 1931
A	Farmer do. (Proprietor)			C	Farmer	Peasant Proprietor	Farmer, cultivator of land
B	Farmer do. (Tenant)						
D	Labourer in the field					E	Farmer's relative assisting
						F	Agricultural Labourer

It would appear from the context in which they are used that the classes A and B of the earlier years were intended to comprise the same groups as class C, of 1871 onward; also that these represent the number of cultivators working land on their own account who have no other major occupation.

Class D was subdivided in 1891 and later years to take special account of those farm-workers who were close relatives of the land-holder. There is no close equivalent in the post-war material for this group, for the 1948 Census takes no heed of the family relationships, while the Departmental enquiries make inadequate reference to the admittedly small group of farm-workers who are not members of landholders' families.

If the classes A, B, C and D, E, F can be presumed to be comparable for the whole of the period, even to a wide degree of approximation, then a general upward trend in the numbers of landholders, balancing a downward trend in the number of farm-workers, is apparent (Table 36).

Short-term variations in these trends result, at least in part, from misclassification of persons as between the two groups, but of greater significance were the succeeding slump and boom conditions in Maltese agriculture, which in turn are to be related to contemporary, but opposite, fluctuations in the general economy of the Islands (Chapter V A). A fall in the number of full-time farmholders need not imply an absolute recession from the land, but rather that numbers of farmers are taking alternative employment, which, for a period, becomes their principal occupation. In the meantime the land is being worked on a part-time basis, or by the men's wives and families.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

Table 36. Agricultural occupations - male and female.

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Farmholders, farm-workers, and total workers on land (excluding sheep and goat herders).

		1842	1851	1861	1871	1881	1891	1901	1911	1921	1931
Farmholders	%	27.2	19.7	17.1	30.2	19.1	37.4	36.4	47.9	41.1	47.3
Farmworkers	%	71.9	78.4	80.9	68.1	78.5	61.4	60.4	51.4	56.9	51.1
Total workers on land	%	100	100	100	100	100	100	100	100	100	100
	000's	12.2	13.4	10.8	15.4	15.3	15.3	13.8	15.1	16.2	13.6

The general increase in the numbers of farmholders could have arisen entirely within the class itself, by the repeated re-allocation of land to succeeding and larger generations. Similarly the full decline in the numbers of farm-workers may be related to increased alternative employment or to emigration. However, case-study material seems to indicate that many families whose members had traditionally been landless labourers, working in fields, quarries or industry, as wages rose and fell began to acquire a direct interest in the land, thereby moving from one class to another without affecting the total agricultural labour force. Such a family history is examined in detail later in this chapter.

Another factor influencing the numerical increase and progressive reduction in size of holdings has been the long-term expansion of part-time farming. In this sector data is particularly limited and of dubious value. Table 37 consolidates all the relevant material.

Table 37.

	1891	1901		1956
'Farmers'	5,727	5,038	Full-time farmholders	4,706
'Part-time Farmers'	2,263	800	Part-time farmholders	5,337
			Other farmholders	1,368
Total	7,990	5,838	Total	11,411
Number of holdings	9,272	9,178	Number of holders	12,640

The discrepancies in the earlier two years between the numbers of farmholders and of farmholdings arise from the differing bases of the material, and because the number of holdings includes returns by the 'owners of fruit gardens and field labourers with very small amounts of land'. Similar explanations apply in 1956. These doubts notwithstanding, it is quite clear that a major part of the increase in holdings is made up of holdings farmed on a part-time basis; the number of farmholders principally dependent on agriculture having declined meanwhile.

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Earlier in this chapter, the point was made that most farms contain land of various types. Apart from virtually non-productive waste land, the main distinction is between dry land and irrigated land. The distinction is not always very clearly set between the two groups, since land can also be considered as 'semi-irrigated', as in the Farm Register. However, this type of land, watered from rain-filled cisterns perhaps twice or three times per season, cannot compare in output with the perennially irrigable land. The crops on this latter type of land will be watered at ten-day intervals for a period of six or more months. Semi-irrigated land is grouped by the farmers themselves with dry land as *raba bogħli*, while perennially irrigated land they refer to as *raba nagwi*. So long as data is based on the agriculturalist's own criteria there seems little danger of confusion.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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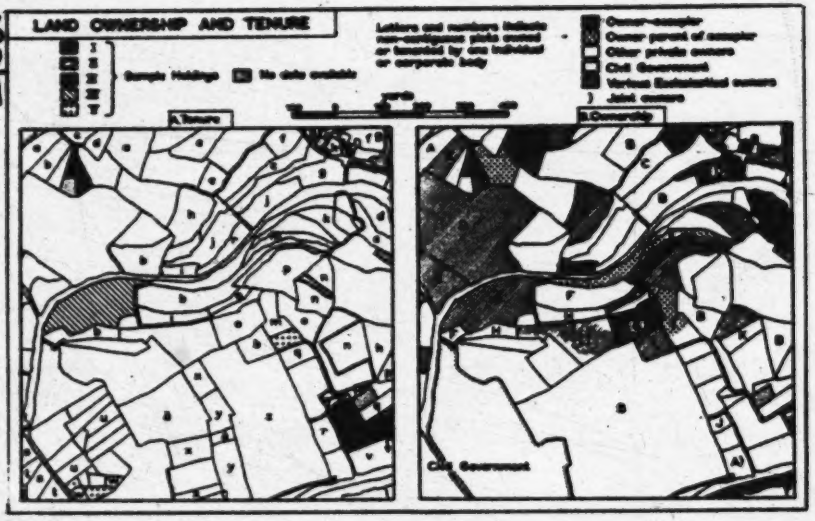

Fig. 135 Land Ownership and Tenure.

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From data supplied by the Central Office of Statistics, Table 38 has been produced. It shows the proportion of holdings, according to size range which contain only dry and only irrigated land, together with the proportion of holdings containing both; and on a simple areal basis, the predominance of each class of land within the mixed holdings. Table 38, as it stands, gives a valuable indication of the varied character of holdings. The great majority of holdings (83.5 per cent.) are seen to consist of dry land only. A very small proportion, less than half of 1 per cent., contain irrigated land only. The balance of 16 per cent. of all holdings are 'mixed'. The majority of these mixed holdings contain less than 5 *tmien* of irrigated and less than 20 *tmien* of dry land. It is clear that the additional productivity of the irrigated land will not affect a sufficiently large number of holdings, nor to a degree great enough, to upset the earlier conclusion that Maltese farms are extremely small.

The conclusions thus far drawn may now be summarised. Farm holdings of the Maltese Islands show wide variations in size, and their productivity is also very variable since farms consist of different classes of land held in varying proportions. Gozitan farms are smaller than those of the larger island, but everywhere the numbers of large and medium sized farms have been greatly reduced during the past 70 and probably 100 years; the residual holdings are mainly small. Encroachment on farmland by the expanding urban areas, roads and military installations may have been compensated in some degree over the long period by the development of former wastelands. *Morcellement* has been a characteristic internal process affecting the agricultural sector. It appears to have arisen partly through the sub-division of holdings amongst successive generations, but also through the acquisition of land by former landless families. Increasing, but uncertain urban employment has encouraged the growth of much part-time farming, which practice has in turn, contributed to the overall pattern of small holdings.

Table 38. Percentage of all holdings according to the amount of dry and/or irrigated land occupied.

Maltese Islands 1956.

Horizontally: quantity of dry land held.

Vertically: quantity of irrigated land held	Tm.	0	10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
	0	+	51.66	18.63	7.29	3.25	1.50	0.71	0.30	0.11	0.05	0.03	-	83.53
	5	0.31	4.83	4.26	1.75	0.97	0.39	0.21	0.08	0.02	0.04	-	0.01	12.83
	5- 9	0.11	0.56	0.78	0.55	0.28	0.09	0.08	0.04	0.01	0.02	-	0.01	2.53
	10-14	0.04	0.17	0.16	0.16	0.10	0.04	0.03	0.01	-	-	-	-	0.69
	15-19	0.02	0.06	0.07	0.03	0.01	0.01	0.01	-	-	-	-	-	0.20
	20-24	0.02	0.02	0.02	0.03	0.04	-	-	0.01	-	-	-	-	0.14
	25-29	-	0.03	-	-	-	-	-	-	-	-	-	-	0.03
	30 34	-	-	0.01	0.02	0.01	-	-	-	-	-	-	-	0.03
	35	-	0.02	-	0.01	-	-	-	-	-	-	-	-	0.03
	Total	0.49	57.35	23.92	9.85	4.64	2.02	1.02	0.43	0.14	0.10	0.03	0.02	100.00

100% = 12,552 holdings.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

This small agricultural entity, the Maltese Farm, is further split into a number of non-contiguous plots or parcels, each of no great size. In illustration of this and other related points a small area in Malta, square in shape with a side half a mile long, has been examined in some detail (Fig. 135). The area lies in the Central Region, between Siġġiewi and Żebbuġ, and includes in its north-eastern corner, part of the latter settlement. It is dissected by two steep-sided valleys, that of the Wied il-Beqqiegħa crossing from south-west to north-east, and the Wied il-Ħesri which appears in the south-east corner. Narrow, terraced fields follow the contours of the valley sides but, on the more rounded relief of the interfluve, the fields, although still terraced, become generally larger and more nearly square in shape. Apart from the valley-floors, used as foot- and cart-ways, with other accommodation roads and paths, non-agricultural lands are limited to a few house-sites in the outskirts of Żebbuġ. A few scattered patches of rock outcrop occur on the steeper slopes, but the only large patch of uncultivated land covers the north-eastern lobe of the large tenancy plot lying south of the area shaded black in map. The remaining land is devoted to dry farming crops characteristic of the region.

LAND TENURE (Fig. 135A)

The underlying topography, clearly influences the shape, and, to a lesser extent the size of the tenurial plots. This is most striking in the north-eastern quadrant, where long, narrow plots reflect the sinuous terraces of the Wied il-Beqqiegħa; on the slopes of the Wied il-Ħesri, however, the relationship is scarcely apparent. Shallower gradients are covered by plots of fuller and more varied shape differing greatly in size. In the north-east corner small and oddly shaped tenancy parcels are clearly related to the nearby settlements and are mainly specialised garden plots. An anomalous area of small plots in the opposite corner breaks up the general tendency of increasing size away from the casal.

Tenancy units are small in size, but there is enormous variation. The average of the parcels shown here, including parts of parcels beyond the limits of the area mapped, is slightly less than 5 *tmien* The smallest garden plot (*b*, north-east corner) contains about one-twentieth of a *tmien* of land, while the large plot of fieldland in the south (*z*) is about 50 *tmien* in extent. There may be a tendency for plots to be larger in areas where soils are thin and poor, but the two distributions can certainly not be equated.

Of the 129 plots, parts of which lie within the half mile square, 57 are held by farmers with no other land in the area. But the remaining 29 holdings each have two or more non-contiguous parcels. This relationship is indicated by the use of distinctive shading in the case of Sample Holdings II and V, and otherwise by the letter *a* to *z* and *d*. Holding *b* (six plots) scattered throughout the northern two-thirds of the area is an extreme example of the typical parcellation.

LAND OWNERSHIP (Fig. 135B)

In general terms, within the area shown here, the distributions of ownership and of tenure are similar. As shown in Fig. 135B, there are many scattered plots belonging to the same owner, a characteristic which might be termed fragmented ownership. A similar cartographical convention to that used in Fig. 135A is adopted here. Plots owned by the same private owner are indicated by the letters A-J (I is excluded); the numbers 1-4 are used similarly for the various classes of ecclesiastical ownership. All plots, whether duplicated or not, belonging to the latter class, which includes monastic, episcopal, and parish land, as well as land owned by Charitable Institutions (a very small proportion in this area), are distinguished by a special system of shading as also are Civil Government lands. The rather special cases of ownership by the occupier or by his parent are also distinguished from the bulk of the parcels which are owned by other private persons.

Looking at the distribution in its basic form, as a simple pattern of parcels, ignoring the various special relationships, several points emerge. As in the map of tenure, there is a complex network, but the weave is generally coarser,

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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the plots larger in size. The average ownership/plot is 7.33 *tmien*, and although the smallest is still one-twentieth of a *tomna*, the largest is now over 100 *tmien*. Thus the landscape can be considered as a series of four webs, the mesh of which becomes progressively smaller. The two larger are illustrated here: ownership parcels and tenancy plots. Next in magnitude is the field pattern, shown in detail on the standard 6-inch and 25-inch maps, and finally the crop-stand pattern with its very small units, amply illustrated in other sections of this book. But the alignments of these various sub-divisions are by no means constant from the smaller to the next larger. For example, some of the boundaries of the tenancy plots run across the middle of fields; similarly a parcel held by one tenant may be owned by more than one landlord. Nevertheless, in any given area, as here, the various patterns show clear evidence of their family relationship and the tendency for plots to decrease in size with proximity to the settlement is more clearly defined in the map of land ownership than in that of tenure.

Common ownership of several plots adds complexity. The owner of plots B is clearly the largest landowner although his plots are widely scattered. Next in order of magnitude, if it be considered as one ownership, is Ecclesiastical land. The Church lands are interesting, by virtue of the contrast between the large blocks owned by the monasteries (3 and 4), and the scattered episcopal (2) and parochial (1) lands. Owner-occupied and family-occupied land is concentrated to the north-east, where the relative ease of access from and to Żebbuġ has been a factor in the acquisition of freehold land. This same tendency has been observed during field investigation in many other parts of the islands.

How far does the pattern of ownership influence the detailed structure of farm holdings? The difficulty of answering such a question is illustrated by a comparison of Fig. A with Fig. B. The greatest dissimilarity of the two distributions is occasioned by the division into small tenancy plots of the Government-owned land of the south-west. But, apart from Sample V, it is noteworthy that holders of land in this sector have no other land within the area. The conclusion is that these are portions of an original holding, which has been sub-divided. However, tenancy holdings are by no means limited to one ownership holding. A striking example of such non-conformity is afforded by tenancy holding *b*, consisting of six tenancy plots. These six plots have seven separate owners, including the farmer as owner-occupier of the small garden plot (north-east corner). One plot (that immediately south of sample holding IV, centre-west) is owned by three persons. Is this an indication of an attempt to consolidate a holding? - or has contiguity merely enabled the tenant to know of an ensuing vacancy so that he could speak for the new tenancy in advance of any competitors?

Special attention is given in Fig. 135B to owner-occupiers, and occupiers of land owned by their parent. Test *m*'s holdings within the area are limited to land owned by his father's heirs *E*, while a portion of his ownership is occupied by sample holding V. This case comes nearest to contradicting the generalisation that none of those owner-occupiers having more than one plot in the area own land occupied by other farmers; on the other hand each has land leased from another owner, and that those with but a single plot in the area are tenants in other parts of the region.

Close examination of the two maps will reveal further illustrations of these complex inter-relations.

The principal points arising from an examination of this case-study may be listed as follows:-

(1) The tenurial plot is very variable in size, but averages some 3½ *tmien* in area.

(2) The shape, size and distribution of the plots making up the tenurial pattern is influenced by all, but not controlled by any of the following factors: relief, soils, land management, field shape and size and ownership.

(3) Descriptively, farm holdings and land property may both be held to be fragmented.

(4) Tenurial holdings display a complex and extremely varied range of relationships with various estates.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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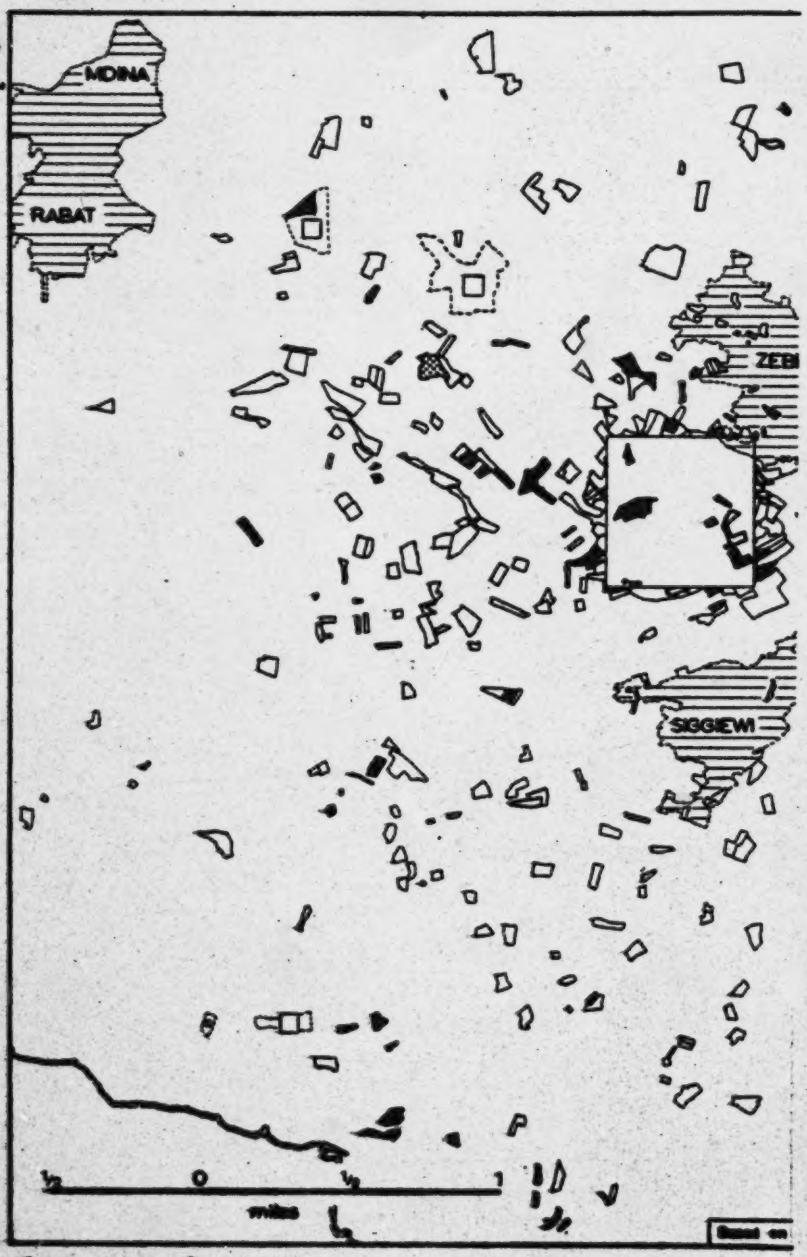

[p. 298-A]

Fig. 136 Fragmented Farm Holdings.

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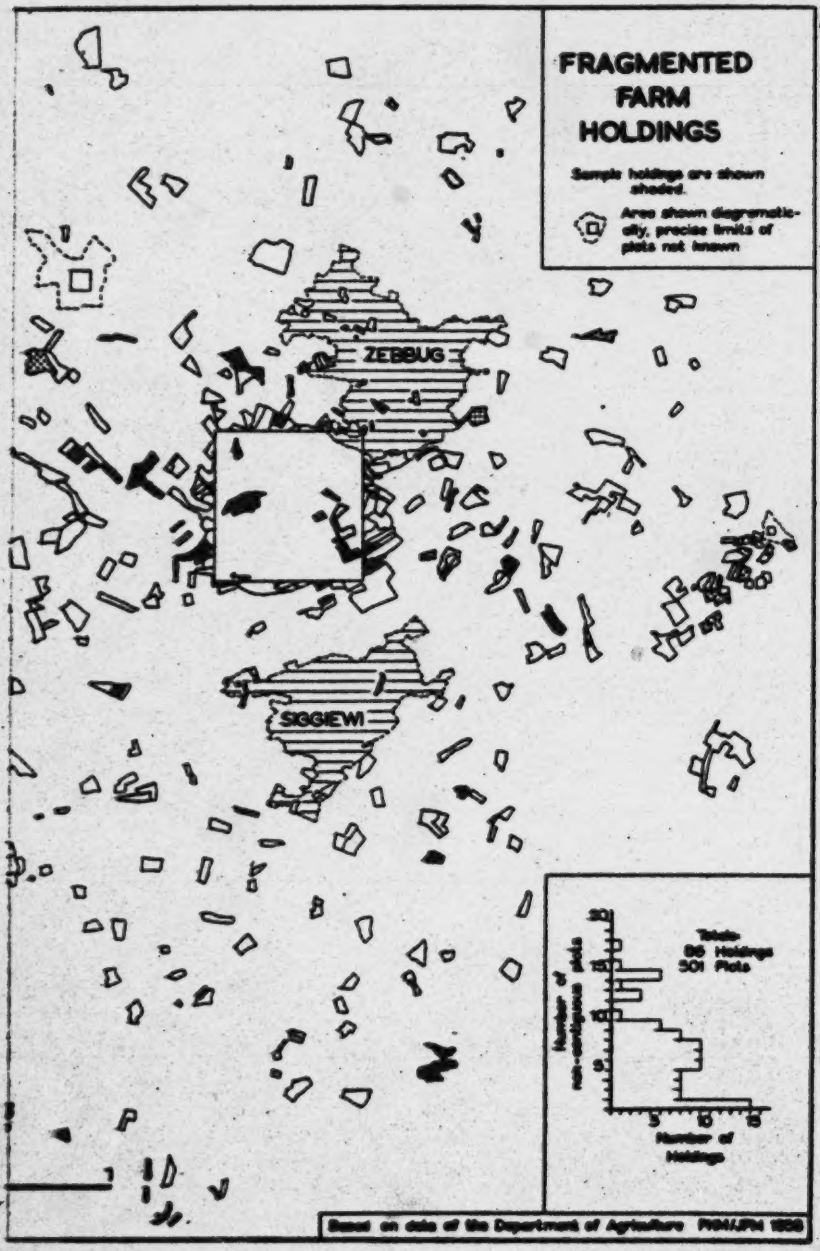

Fig. 136 Fragmented Farm Holdings.

[p. 298-B]

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102 (5) So far as existing patterns can be self-explanatory, it would appear that farm holdings are composed of scattered plots by virtue of several processes; the splitting up of single holdings among several tenants, the letting to a single tenant of parts of a fragmented estate and by the collection under an individual's control of a number of entirely separate plots of land.

However, Fig. 135 does not fully explore the degree to which parts of holdings are scattered, since many plots may lie well outside the half mile square. That this is so to a considerable degree is demonstrated by Fig. 136.

In the centre is shown the area represented by Fig. 135. All those farm holdings, having plots or parts of plots within this smaller square are shown in full. Including the 129 plots of Fig. 135, 501 non-contiguous plots farmed by 86 separate agriculturalists are represented. In those cases where the Farm Register Map is incomplete and the sub-divisions of larger tracts are not yet fully known, the outline of these tracts is marked, containing a symbolic plot proportional to the area held within that tract. 501 should therefore be regarded

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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as a slight under-estimate of the number of plots concerned.

Geographically, the holdings spread over a large area, circular in shape, with a diameter of some 4 miles. The half-mile square is excentric to this distribution, whose spread is greatest towards the coast, in a south-westerly direction. However, there is also a considerable thinning out in this direction, and the maximum number of plots cluster about an east-west axis cutting through the square. Within this belt, and to the north, plots tend to be somewhat larger than to the south.

All these plots are farmed by people who live either in Żebbuġ or Siġġiewi; 31 of them in the latter. The built-up areas of these casals and also that of Rabat-Mdina are shown. In the north-west, many of the Żebbuġ-Siġġiewi holdings encroach on the parish territory of Rabat, while a broad belt of inter-mixture of Żebbuġ and Siġġiewi holdings follows the inter-parochial boundary. In terms of farm holdings, parochial limits have only a very general validity, and it seems unlikely that the parishes have possessed any real economic integrity for a considerable period, if ever. The maintenance of parish units during the various agricultural censuses has presented analysts with many problems, but it is extremely difficult to see what other small units could be adopted.

Five of the holdings of Fig. 135 are given distinctive shading, and plots belonging to these are also particularised in Fig. 136, where a key makes identification possible. As it appears, fragmentation is an exceedingly difficult thing to measure with precision, since it is a function of the area of the holding, the number of the constituent parts and their relative isolation. Sample holding V, for example, consists of 17 separate plots and a direct line between the furthest plots is almost 2½ miles long. That this sample is unexceptional can be judged by the geographical scatter, and from the diagram appended to Fig. 136 which relates the number of holdings to the number of separate plots within each holding. Apart from single-plot holdings, of which the majority are small in size and held by part-time cultivators, more than half consist of six or more plots, and the average for all holdings is between five and six non-contiguous plots.

In the course of this examination, an assessment has been made of the extent to which farms may be described as fragmented. It is often suggested that *parcellement*, as a process, is partially responsible for this characteristic. However, in order to assess the degree of importance of the various processes, an historical perspective would be most valuable. It has therefore proved necessary to follow a long trail of field enquiry in order to build up the case-history which closes this chapter.

Before discussing this material, however, it would be advisable to comment briefly on the validity of conclusions based on the above example, upon certain causes which are constantly invoked as full and adequate explanations of the scattered character of holdings, and upon the Laws which lie behind the present Maltese agricultural systems.

Within the complex processes of the development of farmholdings, the element of ownership must obviously play an important part. Unfortunately the translation of source-material into statistical and cartographic forms is by no means easy. The Farm Register is the only official source for cartographic representation and, until the proposed Cadastral Survey is complete, will with all its faults remain the main analytical tool. Few areas are completely registered and, even in these, the true ownership of land has not always been ascertained. The area already considered, that lying between Żebbuġ and Siġġiewi, is less affected than most by such deficiencies.

Differentiation between the main classes of ownership is of basic importance. Some classes of Church and Government lands have had sufficient historical continuity of ownership to allow one to ignore effects of sub-division by legacy. Owner-occupied farms on the other hand are more prone to such *parcellement*. On the economic plane, differences in the level of rents demanded by various classes of owner can also have a considerable influence on farm morphology.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*423 Quantitative estimates of these main classes of owner, available at a national level, are presented in Tables 39 and 40. Since they are incomplete and to some extent suspect, an attempt is made to rationalise some of the inconsistencies. In particular, percentage analysis has been resorted to, in order to overcome fluctuations of the agricultural area from one year to another.

Table 39. Land ownership and quality of land. Malta.

Percentage of total agricultural land.

	Civil Govmnt.	War Dept.	Church, etc.	Private Landlord	Owner Occupier	Total %	Total 000 tm.
(a) Cultivated land							
1891	13.8		16.8	61.2		91.5	124
1901	13.3		17.1	61.0		91.4	107
c. 1945	13.4		18.5	54.6		86.5	115
	13.8	0.08		45.8	8.8		
1951	80.0				8.2	88.2	
1953	78.9				6.7	85.6	
(b) Uncultivated land							
1891	1.6		0.7	6.2 (2.6*)		8.5	12
1901	2.3		1.7	4.7		8.6	10
c. 1945	3.7		3.8	7.3		13.5	18
	3.4	0.3		6.3	1.0		
1951	11.0				0.6	11.6	
1953	13.8				0.7	14.5	
(c) Agricultural land							
1891	15.4		17.2	67.4		100	135
1901	15.8		18.7	65.7		100	117
c. 1945	17.1		31.0	62.0		100	132
	16.0	1.1		52.2	9.8		
1951	91.0				8.8	100	137
1953	92.7				7.4	100	143

*Ownership 'indefinite' - excluded from totals.

In Malta, the proportion of privately owned land appears to have fallen by some 5½ per cent. since 1901, with increases of 1½ per cent. and 4 per cent. respectively in Government and Church owned land. In Gozo the trends are the same but their amplitude greater.

One complicating factor is the difficulty of ascertaining the actual owner of a particular parcel of land. The frequent practice of returning an agent's name, or even the name of one member of a group of co-owners can only be neutralised by field checks. It is also known that some semi-literate farmers have returned land held under very long lease - particularly important within Church estates - as freehold.

One recent and important obfuscation of the picture has resulted in an apparent contradiction between Caruana and Missi (1, 2) on the one hand, who showed that in 1947 the area of freehold farmer-owned land had increased, and more recent figures which confirm the apparent long-term decline. In the economic situation prevailing before World War II, the ageing farmer would retain legal ownership of his land until he was incapable of working it, at which

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Table 40. Land ownership and quality of land. Gozo.

Percentage of total agricultural land.

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	Civil Govmnt.	War Dept.	Church etc.	Private Landlord	Owner Occupier	Total %	Total 000 tm.
(a) Cultivated land							
1891	18.0		6.4	67.7		94.1	37
1901	21.1		11.3	62.8		95.2	32
1951	83.4				9.5	92.9	
1953	84.8				8.6	93.4	
(b) Uncultivated land							
1891	0.5		0.2	3.1 (1.1*)		5.9	2
1901	0.8		0.8	3.7		4.8	2
1951	6.6				0.5	7.1	
1953	6.2				0.2	6.4	
(c) Agricultural land							
1891	18.6		6.6	72.8		100	40
1901	21.6		11.8	66.5		99.9	33
1951	90.0				10.0	100	36
1953	91.1				8.9	100	38

*Ownership 'indefinite' - excluded from totals.

time, ownership would change. Since 1947, the existence of savings amassed during the price boom of World War II and the granting of old-age pensions have together encouraged the farmer to retire at an earlier age from active management and, through various crop-sharing agreements, to divide the usufruct with heirs, relations and friends. New types of tenure ensuring security to the original owner and opportunity to others are of considerable significance. Thus, over a short period of time simple freehold may be replaced by other legal situations although the *de facto* position of owner-occupied land as a whole remains unchanged. 854 745

Increasing accuracy of classification may correct these and other discrepancies but may in itself and as a result of such corrections introduce apparent fluctuations in general trends. Thus, because it is reasonable to assume that the most recent figures are most likely to be accurate, minor trends culminating in recent records should be ignored. 423* 129

Thus it is that, in the absence of external evidence, we may say that increases in the actual or proportional areas of land owned by Church and State have been insignificant. Table 41 shows in round figures the probable proportions of land owned by the various groups, based on various sources and broadly correct for the years around 1950. We are satisfied that this gives a more accurate picture than that usually presented.

The character of ownership and its effects on land use must also be related to the character of the land itself. Tables 39 and 40 show, among other features, the growing amount of 'wasteland' which now makes up some 15 per cent. of the so-called farmed area of Malta, and a lesser proportion of Gozo. This 'waste' is mainly marginal land which bears clear traces of earlier cultivation. True 'wasteland', virgin karst or long-abandoned, has always been excluded from the total figure. 423*

It has been suggested that such figures show that freehold property (in which the farmer might be expected to have the greatest interest) is most likely to

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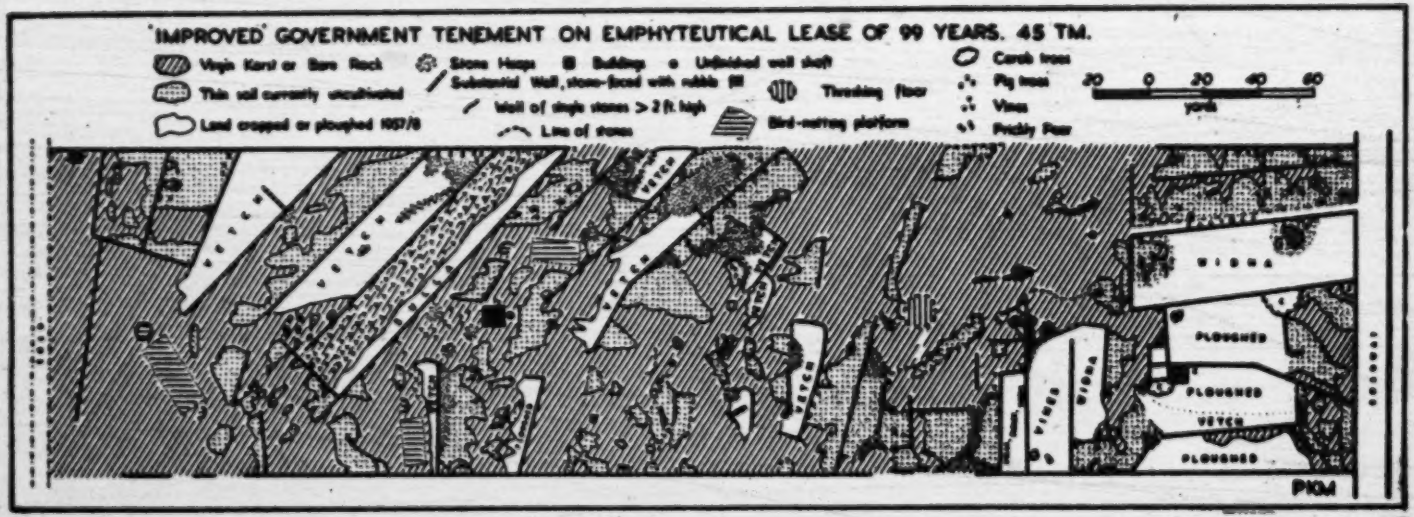
'IMPROVED' GOVERNMENT TENEMENT ON EMPHYTEUTICAL LEASE OF 99 YEARS. 45 TM.
Virgin Karst or Bare Rock
Thin soil currently uncultivated
Land cropped or ploughed 1957/8
Stone Heaps
Substantial Wall, stone-faced with rubble fill
Wall of single stones > 2 ft. high
Line of stones
Buildings
Unfinished well shaft
Threshing floor
Bird-netting platform
Carob trees
Fig trees
Vines
Prickly Pear
20 0 20 40 60
yards
VETCH
VETCH
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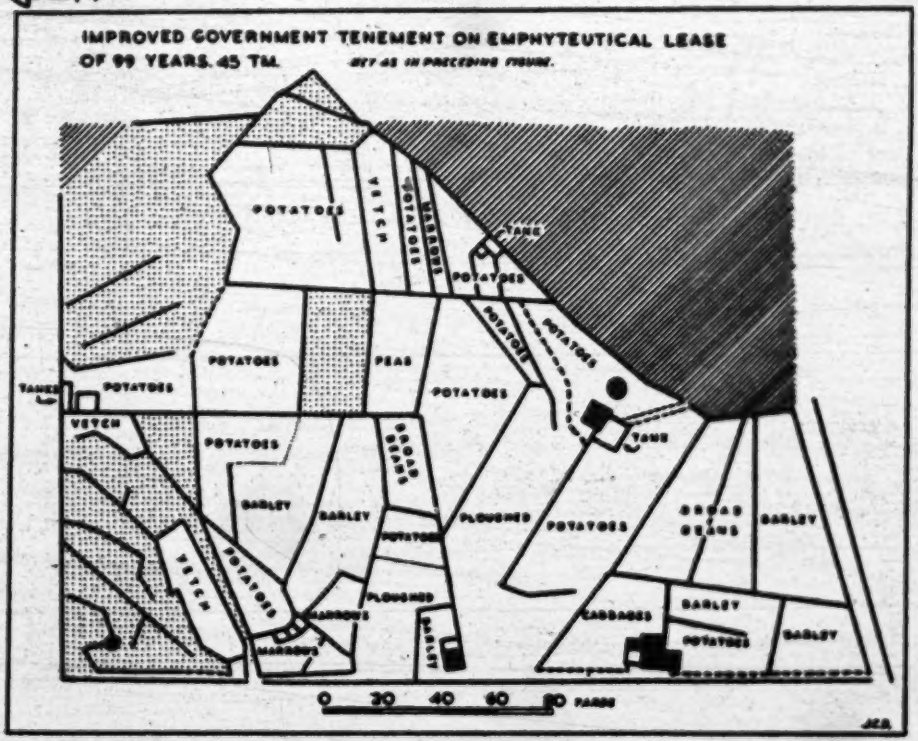

Fig. 138 Improved Government Tenement on Emphyteutical Lease of 99 years (second example).

[p. 302-B]
[For key see Page 302-A]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Table 41. Estimated percentages of total agricultural land owned by various groups, c. 1950. 423*

	Civil Govt.	War Depts.	Church, etc.	Landlord	Farmer's Family	Farmer	Total
Malta	16	1	22	51	2	8	100
Gozo	23		12	54	2	9	100
Both Islands	19		19	52	2	8	100

be properly worked. This argument as a basis for encouraging owner-occupance must be treated with some suspicion. All the field evidence goes to show that, in recent years, land purchases by working farmers have been mainly of good and, if possible, irrigated land. The Maltese agriculturalist rarely makes a conscious assessment of his returns in terms of productivity of labour or capital but rather the emphasis is placed on gross production. Nevertheless, general productivity, security of harvest and even social status all make him buy the best land, even at inflated prices. Little of such freehold property is difficult to work and little of it therefore lies 'waste'.

Historically there is further proof that the incentive of ownership is on its own of no great importance in increasing the proportion of worked land in any holding. Early nineteenth century writers both commented on the large areas of rock and other wasteland in the North of Malta, and on the age-old practice of building 'artificial fields' (see p. 324). There was a widespread belief that the whole of the cultivated land had been created in this way and that further extension was mainly a matter of encouraging the farmers to undertake the labour involved. A Commission of the *Società Economico Agraria* considered the question and made in their report of 1848 (3) the following points. First, any increase in agricultural production, particularly of grains, would be welcome. Secondly, there existed a pool of grossly under-employed labour and capital. Thirdly, although the physical extension of the cultivated area would be a slow process, the national advantage would be great. Fourthly, this end could be achieved by the granting of land in perpetual emphyteusis so that capital and labour could be securely applied to reclamation. In 1855 Schembri supported such a policy (4).

From 1850 onwards, much barren Crown land was distributed on this basis, frequently in parcels of 16 *imkeb* and on 99-year emphyteutical leases. Subject to improvement (a clause that does not appear to have been enforced), the tenant had complete security of a tenure which could be renewed by his heirs on a preferential basis at low rents. During the first period rents could be as low as 1½d. per *tomna*.

Although some land was improved, the project as a whole was not a great success. Economic and social changes can be held responsible for some of the lack of response to these offers, for the second half of the nineteenth century was a dynamic period. In spite of much Crown expenditure on the laying out and construction of access roads, and the building of many field and terrace walls, some land was never taken up and more remained economically marginal. Of the leased land, a considerable proportion was later abandoned.

The main factor making for local success or failure of the scheme was the availability or otherwise of water. Two contrasting examples illustrate this point. Fig. 137 shows an area of 16 *imkeb* in the hands of one tenant. Small patches of vetch are the sole evidence of use. Figs and vines planted during early development no longer bear fruit. This long-lease land is virtually waste. The other example, illustrated in Fig. 138, has similar terrain and is more exposed to wind and seaspray. Here the presence of a shallow water-body has provided an incentive for the slow development of a soil cover and enabled intensive cultivation to succeed. Twenty-two heirs of the original lessee have each insisted on their right to work a portion of the holding.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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*423 654 These are extreme cases but everywhere it is true that during the last century, continuity of tenure has not been enough in itself to produce land improvement.

*423 427 A variety of forms of tenure exists in the Islands. Emphyteutical leases, which must be documented, are legally all such that extend for a term longer than 16 years and have the proper content and conditions. On Crown land a period of 99 years has been favoured, but leases of 30 and 60 years are also found. The essence of such leases lies in their emphasis on tenant improvement of the land and on compensation for premature dispossession. Some of the implications of the official encouragement of emphyteusis have already been examined. In general the system is based on the supposition that the lease is long enough to reward the tenant for his development work, and that the land has been improved to a level at which short-term leases - first offered to the emphyteuta's heirs - become feasible.

Other leases are generally based on a four-year rotational cycle, in its turn based on the duration of the effects of intensive manuring on 'dry' land. Entry is normally on 15th August, in the 'dead' period of the year, and the most popular lease is for a duration of eight years with an option for renewal for a further similar term. On expiration the land is usually held on a yearly basis until a new satisfactory settlement is reached. Provisions for repairs usually divide responsibility between tenant and landlord on the basis of the scale of work and capital needed, the tenant being always responsible for wells and cisterns. Water derived from the holding should only be used thereon but in practice this is ignored. Regulation of husbandry is rarely mentioned except in general terms. Unless specifically revoked, legal provision exists for the remission of rents in the event of naturally caused crop-failure, although we have no knowledge of such a claim being made in recent years. After the flood damage of the autumn of 1957, the appeals were solely for Governmental aid.

The problem of compensation for improvement or for dispossession has in Malta as in other countries given rise to much disputation. Unless agreed by the landlord, any improvements to short-leased land can only be indirectly recovered either by removing impermanent fixtures or by the incoming tenant paying for items such as recent manuring or tillage. In the latter case, both parties regard the transaction in the light of a hand-over charge rather than as formal compensation.

Before 1940, the short-lease tenant had little legal security of continuity of tenure. On the termination of a lease the sitting tenant had preferential rights to renewal only if he were prepared to accept conditions equally or more onerous than would other applicants, provided the courts held these conditions to be reasonable. Such preference was negated if the land was needed by an owner or cousin or nearer relation of the owner. Theoretically, therefore, the ability of the tenant-farmer to resist rent increases or to prevent loss of investment was very limited. Wartime Emergency Regulations resulted in the creation of a special Board to consider problems of tenure where leases were shorter than for 16 years. Since that time preferential rights of renewal have been extended to cover immediate relations of a deceased tenant or to the equivalent of 'copyholders'. Rent increases must not be based on any increase in value accruing from any type of improvement, and their reasonableness is adjudged by comparable neighbouring rents. Greater freedom was afforded in sub-letting to a co-tenant or relation while the landlord's personal or family claim on land has now to be justified on the basis of a minimum four year use.

*423 311 427 The combination of short leases and absence of compensation for improvement has been held at one time or another to be responsible for virtually all the ills and defects of Maltese farming from a reluctance to plant tree-crops to the poorness of many local track and access roads. As with the relationship between freehold tenure and intensity of land use, such arguments are not fundamentally valid. Where physical economic conditions provide incentive to investment and improvement then the cultivator generally responds, no matter

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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what type of lease. However, many of the minor variations in land use which exist as between adjacent fields or parts of fields can be partially explained on the basis of their legal position. Thus the wasteland of il-Wilga in the Wied tal-Pwales reflects both physical deterioration and a tenurial conflict. But, as may be observed throughout the regional and distributional studies in this volume, the patterns observable in Maltese farming are resultants of many forces and influences, in which the legal element plays a very minor part.

A third type of tenure, that of share-cropping, appears in some rather specialised forms in the Maltese Islands. Between land-owner and occupier, its main incidence seems to be as a working arrangement between aged parents and their children. Between coevals it appears as a temporary form of subletting known as *bin nofs*. Some of the factors influencing the first type have already been examined. In the second case, share-cropping arrangements are a consequence of the growing tendency of farmers to leave the land for short trial periods to seek other employment or to emigrate. As a form of insurance, leased or owned land is then often let temporarily to relatives or friends on the understanding that should the farmer return, his land reverts to him or in the case of the time-limit (usually five years) elapsing before his return, the share-cropper takes over full rights. Although this is of doubtful legality in the case of rented land, landlords do not seem to object. In the north and west of Malta, over 6 per cent. of the cultivated area is held in this way, and the proportion is over 3 per cent. in Gozo. In other areas, share-cropping would seem to be of negligible importance. Because this system appears to be based on expediency, the details of owner-cropper relationship are more variable than in areas where *metayage* is more fully developed as an institution. The provision of land, materials and labour and the division of product vary greatly. One case exists of a whole community working the land under a tenant-in-chief who provides land, seed, manure and some machinery and then claims one-fifth of the value of the crops which he buys back in bulk.

The share-cropping tenures terminate with the death of either party. In all other cases the death of a tenant results in the leasehold becoming part of his divisible estate and liable to fragmentation between the children, all of whom have equal rights of inheritance. The importance of this element in the process of *parcellement* has been regarded as very great, in Malta as elsewhere. Before considering an actual case-study of holding evolution, it is as well to note some of the general points.

First, the family group has strong powers to maintain its hold on land and to exclude others from it. In this they are supported by the action of landlords and by the legal codes as at present framed. On the other hand, little effort is made to prevent sub-division within the family group. Thus no analysis of the process of fragmentation can be made without a full understanding of the nature of the Maltese rural family.

In this chapter, the main elements in the physical and legal entity which constitutes the Maltese farm have been considered. As much as is feasible of the legal and customary background to the farm unit has been considered. In illustration of these points and in order to amplify them, a detailed analysis of the lands of one Maltese family follows. It is appropriate here to record the great kindness, forbearance and co-operation shown by the members of that family without whose considerable assistance such an examination could not have been made.

[123]

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Plate XIX. Tillage - traditional style.

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351

Plate XX. Tillage - new style.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

B. The Lands of a Maltese Family

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It has been found possible to trace the landholding history of a single family back to its very beginning through four generations and slightly more than 100 years. Before about 1850, the family in question had no direct proprietary interest in land. Its members were landless labourers working mainly in the fields of various farmers in the northern districts of the island. They appear to have moved from farm to farm as demands for labour arose. Frequently they worked as a team, occasionally as individuals but always they were paid on a daily basis. Their home was in the casal of Mosta, and there is still some attachment to that centre, although few members of the family continue to reside there.

This study is based, fundamentally, on the oral tradition of the family, refined by studies of the Farm Register, Government Land Records and field identification. For ethical reasons, the family must remain anonymous; its members are therefore referred to by key numbers. The founder-father of our family and his five children are designated 0 to 5 as below. The progeny of each son are numbered similarly, the digits suffixed to the parent's number and so throughout. In addition, the lineage groups stemming from the original five children are distinguished by the letter A to E. Final suffixes 0 denote husbands of the females of the family. [27] [28]

The history begins in the 1850's with a family of five children and their father (0). Four of the children (2-5) were sons and worked for some time with their father as farm labourers. At some stage, the daughter (1), married a farmer with land in the Manikata area, and from her springs branch A of the family. Later, one of the brothers (2) married the daughter of a farmer who held most of his land at Ġnejn Għajn Tuffieħa, and lived nearby. On the death or retirement of his father-in-law, 2 acquired the tenancy of this land in the third year of an eight year lease which had commenced in 1862. Finding that he was unable to work this farm satisfactorily by himself he invited one of his brothers (3) to join him in the enterprise. When the eight year lease was renewed for a similar period, in 1870, both brothers became joint tenants. Their respective descendants form groups B and C of the genealogy. Another piece of land, which had been leased by 2's father-in-law for 99 years from 1861, passed to 2, neither 3 nor his descendants having any share in it.

Meanwhile, in 1857 or 1858, the father (0) and his two remaining sons (4 and 5) acquired the tenancy of an area of partially irrigable land at the head of the Ġnejna valley. Some 12 months earlier the land, with its terraces, had been severely damaged by floodwaters following very heavy rain. The landowner concerned was unwilling to assist the sitting tenant in the repair of severe storm damage to the extent which that tenant expected. Rather than bear alone the full cost, the latter attempted to sub-let outside his own family and was dispossessed by the owner. Our landless labourer (0) and his two sons (4 and 5) evidently felt themselves capable of tackling this reconstruction and, with the landowner's approval, took over the tenancy. It is uncertain whether the landlord gave them assistance in the form of reduced rent, whether they had some capital saved from their meagre wages which they could exploit here, or whether they depended for success entirely on their own labour. Some capital must have been available to them to cover the period of reconstruction and the sale of the first season's crop. It would be characteristic of the period if some financial help was given by the *pilkali* merchants who functioned as the land bank of that day. [426]

There is evidence that local opinion did not rate highly the chances of this landless group in restoring the valley to its former fertility. The story is told of local comment that the family would not stay 'from Christmas Day to St. Stephen's' (25th-26th December). After 100 years of continuous occupation the story affords the family some considerable amusement, but serves to illustrate the shaky nature of the original enterprise. [522]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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Fig. 139 The Landholdings of a Maltese Family

[p. 308-A]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

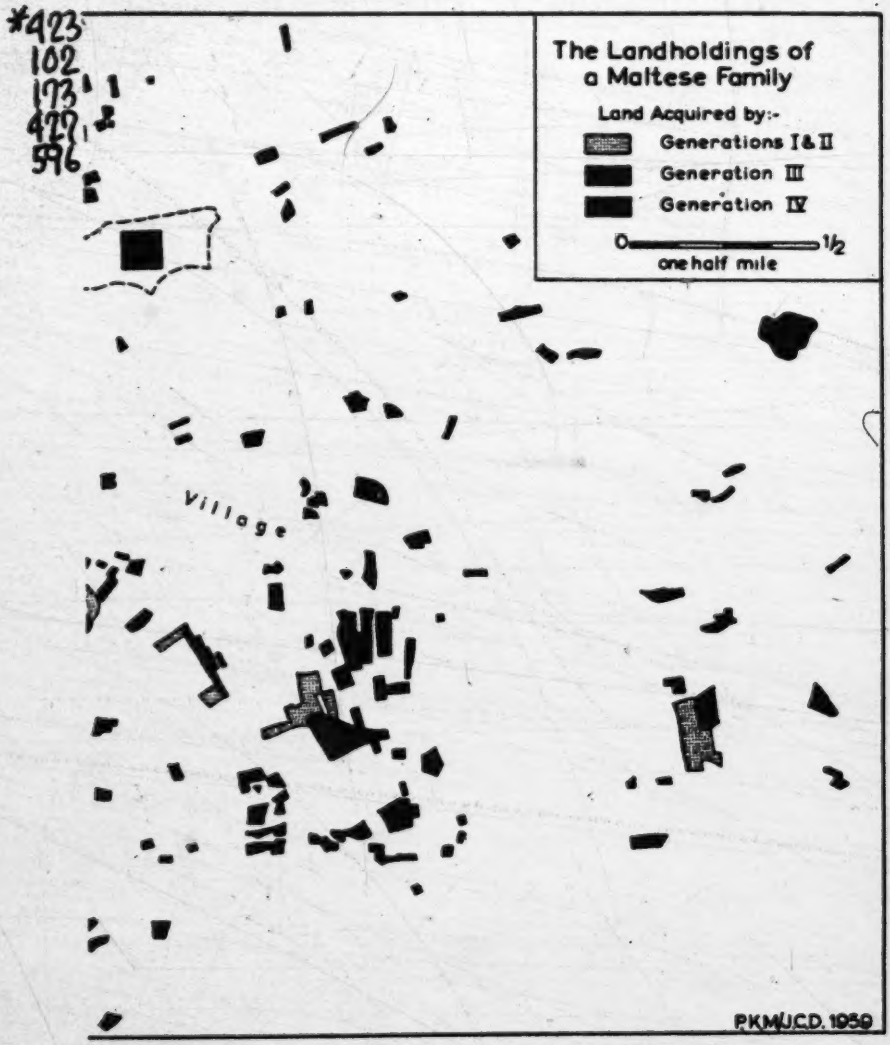

Fig. 139
The Landholdings of a Maltese Family.

[p. 308-B]

*423 This valley land, occupied by 0, 4 and 5, was not originally a single con-
173 tinuous plot, for two other tenants occupied land within the perimeter. At some
427 date, the holdings of these tenants were absorbed by the family, for today the
596 whole plot is held by members of groups D and E, the descendants of 4 and 5. It has belonged, throughout, to a single owner and has been held for many years on an annual lease. For many members of the family it still forms the nucleus of their holdings, though each now works a relatively small portion of it.

Probably in 1880, 5 acquired the tenancy of two 4-*tmien* plots of a 29-*tmien* tenement near to this nucleus, on flat land to the east of the valley and the lease was later renewed, on similar terms, to one of 5's sons (54). On termination of the second lease, an increase of rent was mooted, to which 54 could not agree. After five months, no alternative tenant had been found and 54 therefore re-occupied at the old rent. He took two of the six portions into which the 29 *tmien* were divided, intending one for a brother, who however, did not require it. Both portions are retained by 54's descendants.

One year after this re-entry, 5 and his three brothers were approached by the agent to become tenants of another patch of less fertile land (75 *tmien* including rock). The division was uneven, 2 receiving a nominal 1½ *tmien* despite the plot's proximity to his home and other land. 5, perhaps as the principal tenant, acquired a lion's share (33 *tmien*).

The agent's inability to find alternative tenants for the 8 *tmien* of land and his soliciting of the family to occupy the larger plot, seem to indicate a marked

[p. 308-C]

absence of land hunger at this period, 1895 to 1896. Such a situation had probably existed for some years, since there is no information that other land taken over as a new tenancy, again by 5, at the beginning of that decade was 'lying idle'; at the expiration of a long lease. The area concerned was again substantial and 5, unable or unwilling to tackle the whole plot, joined with two brothers from a nearby hamlet in making a successful bid for the tenement. The land, and also the rent which they had jointly agreed to pay, was then sub-divided, local conditions of soil and quality being taken into consideration.

At some time, possibly during this period, the other brothers, 2 and 3, added to the land obtained by marriage at Ghajn Tuffieha (as a new tenancy and with strangers as co-tenants) another 35 *tmien* some two miles to the south-east, close to what is now the parish boundary in that direction. At a later date (c. 1910) 2 and his son, 21, entered on a new tenement of irrigated land in the Wied tal-Pwales to the north of Ghajn Tuffieha. This was immediately divided into two approximately equal portions, of which the father's was eventually shared only amongst his other children.

The land initially acquired by 2 (the founder of group B) from his wife's family was Government land, which was already at that date split into a number of separate plots, but the other lands acquired by this second generation as new tenancies were fairly large blocks of land, averaging 36 *tmien* in area, including the two 4-*tmien* plots of land leased to 5.

It is clear, therefore, that during the 50 years before 1910 quite large blocks of land in northern Malta were coming on to the leasehold market, and that a family without previous rights of any sort in that land could enter on to it, apply sufficient capital and industry to maintain its hold and, within limits, dictate the amount of rent which it was willing to pay for the use of that land. All the land leased for the first time during this period belonged to owners of large private or ecclesiastical estates and some at least had been surrendered on the termination of long leases. There is strong evidence from all branches of the family that all land leased during this period has stayed within the group, though some naturally has passed to daughters on their marriage. The land acquired in the male line by 0 and 2-5 in this early period is mapped at Fig. 139.

This area mapped in Fig. 139 totals 262 *tmien* and was held by the four brothers in the proportions shown in Table 42.

Table 42. Maximum holdings of generation II. *Tmien*.

	Sons of Farmer 0				
	Son 2 (B)	Son 3 (C)	Son 4 (D)	Son 5 (E)	Total
Acquired by marriage	13½	7½	-	-	19½
New tenancies	21½	42½	56½	121½	242½
Total leasehold	34	49½	56½	121½	262
Freehold	-	-	-	-	-
Total area	34	49½	56½	121½	262
No. of non-contiguous plots	?	?	8	8	?

Even at this early stage, there is considerable disparity in the size of holdings, though this would partly disappear if the relative proportions of irrigated and waste land were taken into account. None of the brothers had any significant financial interests outside farming. 2 and 3 seem to have lived at Gnejn Ghajn Tuffieha but the others remained at Mosta, though many week-nights were spent in rooms which they had in a building at the head of the Gnejna valley.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

As the circumstances of land acquisition would indicate, these early holdings were not excessively 'fragmented' but the seeds of later more complex patterns had been set by the lease of non-contiguous properties and the parcellation amongst themselves or with unrelated co-tenants of large tenements newly leased. However, we must remember that, although the male line of the family held no land before c. 1860, this is certainly not true of all the families into which 0's sons and their descendants married. Accordingly, 2's children and the children of later marriages were only partially descended from the landless strain. With the legal right of equality of division of all heritable property regardless of sex, the expectations of later scions would therefore be enhanced. It must also be remembered that all land held by the later descendants of 0, whether acquired by descent through the family, by marriage, new tenancy or purchase, may with equal validity be considered as the land of other families, whose sons and daughters marry into the family which we have chosen to study. It is a valid case of 'gaining a son, not losing a daughter'. In the present (fourth) generation the family is fully integrated into a complex web of relationships within the village. Indeed an informant has remarked that if someone in the village is not related to him, that person must be a stranger and newcomer to the area.

Notwithstanding these considerations, clarity can only be preserved by maintaining the idea of the family as a developing entity in terms of which land is gained, lost or divided. Division is the normal process by which lands may pass in effect into the hands of a single child, though siblings may be entitled to some form of compensation. Division to all the children need not take place at the same time; an elder child may even receive its share while a younger brother is still unborn. In these circumstances, 'shares' cannot be precise, though efforts may be made to re-adjust at a later stage. A share of parental land is normally the first which a young farmer begins to work as his own. If, as is usual, his departure from the family farm was occasioned by marriage, he may also obtain land from his father-in-law, but this is never *his* in the same sense and is only effectively consolidated with the land of his own family when his children, born of that wife, come to work it on their own behalf.

Generation 3

All the brothers of the second generation are now dead, the last having died c. 1936, and their landholdings split up. The pattern of acquisition of land by the third generation is shown in Fig. 139. Family land passed very unevenly to these groups. For example, in group C, although there were seven other children all land came ultimately to the husband of one daughter (3 to 35). Initially the farm was divided amongst the children.

Table 43. Holdings of Generation III: Group C. *Twien.*

s = son; d = daughter.

	31s	32s	33s	34d	35/36d	37d	38d	Total
Division from parent: 3	¼	¼	¼	¼	45½	¼	¼	49½
Transfers among siblings	-¼	-¼	-¼	-¼	+4	-¼	-¼	4
Total land and max. holding	¼	¼	¼	¼	49½	¼	¼	-
Total land to be passed on	-	-	-	-	49½	-	-	49½
Leasehold	-	-	-	-	49½	-	-	49½

Note: Some of 35's siblings have a little land elsewhere.

In other groups, the demands of each child were more nearly equal, but in none was there a rigid egalitarian sub-division. Even in group B, where all the children received some land, its distribution seems to have been controlled by

need rather than any rigid adherence to the legal issues. All but one of 2's children remained fundamentally within the farming community. The exception (24) married a non-farmer, but even she was given a share of the irrigated land of her mother's portion, presumably to use as a vegetable garden.

Table 44. Holdings of Generation III: Group B. *Tmien.*

s = son; d = daughter.

	21s	22s	23s	24d	25d	26d	27d	Total	Ex. 25d
Division from parent: 2	3	4½	5½	½	1½	11½	7½	34	
Acquired by marriage	7½	3½	-	-	*	2	2	15½	
New tenancies	†32½	11	5	-	n.d.	12½	8½	69½	
Purchase	7½	5	5	-	n.d.	-	-	17½	
Transfers among siblings	-	†22½	-15½	-½	-	-	-6	22½	
Transfers outside family	-	-	-	-	n.d.	-2	-2	-4	
Total land held	50½	46	15½	½	c. 68½	25½	18	c. 223½	156½
Maximum holding size	50½	46	10½	½	c. 68½	25½	18½	c. 218½	151½
Total land to be passed on	50½	46	-	-	c. 68½	23½	10½	c. 196½	130½
Leasehold	43½	41			n.d.	23½	10½		117½
Freehold	20½	5	-	-	n.d.	-	-		12½

*circa 85 *tmien* at Attard. †Of which 11 *tmien* later purchased.

Table 44 shows the distribution of 2's 34 tmien of land, and other data relating to group B. Analysis of this distribution is complicated by the diverse qualities of 2's land holding, especially with regard to irrigated and dry land. But even when allowance is made for this factor, shares cannot be considered equal. The shares of 26 and 27, which passed to their husbands 260 and 270, were inflated by the inclusion of much dry land, but 26 still had a disproportionately large share from her father, perhaps because 260 had little land in his own right (2 *tmien*); the same might also be said of 270. 21 had already halved a tenement with his father (10 *tmien* of his new tenancies) and therefore received only a share of his mother's land, and none of that later added by his father. His brother (22) had a relatively small holding initially but added to it substantially later in life, when he took over the land of some of his brothers and sisters. Similar divisions are apparent in groups D and E.

Of their generation, group B were the most assiduous in adding to land holdings by purchase and new tenancies. Had it not been for their low fertility (23, 24 and 26 had no children, though all were married) they would have dominated the family in later generations. It will have been noticed that much care was taken that 2's children should have a share in their mother's land, while land later added by the father was distributed more partially. The mother's land comes into the family essentially for the use of herself and her children and where there are no children it must be returned eventually to her family. Similar logic applies to land or use of land *inherited* by the father, as is exemplified by 260's 2 *tmien* which, when it became clear that 260 and his wife would not produce issue, was given to his sister for her children. In contrast to some of his brothers and sisters, 22 had a large, vigorous, agriculturally-minded family and this, no doubt, stimulated him into adding to his initially relatively small holding, for not only would his children's labour permit him to expand but also their future welfare would demand it.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

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The basic pattern is thus one of more or less unequal division amongst those children who wish to take up their rights of pre-emption on land, with greatest emphasis on the equality of division of land coming ultimately from a grandparent. At a later stage, 'family' land tends to become concentrated into the hands of the more interested children (e.g. 350 and 22), and along with it some land added by their siblings. The volume of lands added other than by marriage is very much less than during generation II. New tenancies, which totalled 242½ *tmien* of the holdings of 2, 3, 4 and 5, in the holdings of their children amounted to only 93½ *tmien*, although there were at this latter stage 11 individuals actively interested in farming in the district. Sixteen new tenements were entered by this generation and the average size was 7½ *tmien* (c.f. Generation II: 35 tmien). Of these, two were outstandingly large and in both cases tenancy was shared with members of other generations. The smaller (20½ *tmien*) was occupied by 21 and his father (2) in c. 1910, while the other (30 *tmien*) was a co-tenancy between 21, 54, 5410 (54's son-in-law, generation IV) and a stranger, taken up in 1916. Thus, within a short space of six years, or perhaps a little more, three generations were actively acquiring land, this being some measure of the considerable interdigitation of the generations which makes it impossible to refer any one generation to any specific period in Malta's economic history. Where precise dates are known the evidence is thus the more valuable.

An example of the circumstances in which these new tenancies were added is illuminating. In 1916, the sitting tenant of the 30-*tmien* plot mentioned above attempted to sub-let the land to a non-relative. Not only was this done without the owner's permission but he also attempted to exact a premium from his proposed sub-tenant. The landlord was informed and the tenant evicted. Agreement was almost reached between the owner and a prospective new tenant, 410's father, when it was suggested by the owner's lawyer that a higher rent might be obtained on the open market. The tenancy was therefore published, in the traditional way - at Mass in the parish church - and, the joint bid of 21, 54 and 5410 being the highest, they were offered the tenement. The defeated applicant asked if he might share in the tenancy and, in view of the earlier negotiations, all parties agreed to this. This transaction, with the relatively small size of the other new tenancies, would seem to indicate that considerable competition for land had developed since the larger acquisitions of the previous generation. There is here certainly no evidence of land lying idle for five months as had happened in 1895.

The average size of plot added by marriage during this generation was also small, some 5½ *tmien*. A small size is to be expected since these are all subdivisions of other families' land. The increase in total marriage land over the previous generation is roughly proportional to the increase in the number of marriages. As previously, 50 per cent. of the marriages in which the partners continue as agriculturalists involve no exchange of land, but in at least one of these cases (41) land passed from the wife's family directly to the children at a time when they were already independent of their father. Similarly, parts of the marriage lands of 210, 510 and 530 were also passed in this way directly from grandparent or uncle or aunt to the child. This process further emphasises that the land in question is not a dowry in the normal sense of the word, but essentially a settlement on the expected issue of the marriage.

A clear illustration of the economic advance of the family lies in its acquisition, during the third generation, of freehold land. It is doubly significant that only 1½ *tmien* of the 35½ *tmien* freehold came into the family by marriage, the rest was actually purchased by members of a family which, one or two generations earlier, were not even the occupiers of rented land. Most of this freehold land came into group B, where 21 and his brothers purchased 28½ *tmien*.

In these different ways 167½ *tmien* near the old nucleus and some 100 *tmien* elsewhere have been added to the 262 *tmien* handed down from generation II. In contrast, only 4 tmien has passed out of family control during the period. The distribution of this additional land is shown in Fig. 139 where its increased 'scatter' and the smaller size of the unit pieces makes a contrast with the earlier distributions.

By the time this generation was at its prime, the village had grown both in size and facilities and achieved parish status. Gradually houses were built and the old attachment to Mosta was at least partially broken, but some of the farmers retain a house in the casal, now often rented to British Service families from ta'Qali airfield. Saved the need to travel to and from the casal, and increased dispersal of plots will matter much less to the farmer than if that journey still had to be made. 423* 173 596

More directly of concern to him will be the size of his holding. As there are now 13 farmers where formerly there were only four and since the total local area has been increased by appreciably less than 100 per cent., the farmer of generation III must, on the average, have a smaller holding than did his parent or parent-in-law. 350, holding all his father-in-law's land is one exception, and there is considerable diversity from individual to individual and group to group.

Many of the third generation are still alive, some retain control of land and one or two are still actively farming small remnants of their holdings. Therefore it would not be possible to examine the transmission of all their land to the succeeding generation. Nor indeed would this be necessary to the present study since the distribution, so far as it has taken place, has followed the same pattern as that from generation II. However, one aspect of the inheritance of land can best be studied at this stage, an aspect scarcely touched upon earlier. That concerns the physical division of a father's holding when it passes to his children. For example, is a holding of ten plots belonging to a farmer with five sons split into five components each with ten plots, every original plot being divided equally to each son - or, if all the plots are of uniform size will each son receive two plots only? This question is clearly of importance to the whole problem of *parcellement* and *morcellement*. That the true position lies somewhere between the two hypotheses given above is evidenced by the subsequent history of 54's holding outlined below. 423* 596

At its maximum, 54's holding comprised 142 plots in six localities, a total area of 74 *tmien*, distributed as shown in Table 45.

Table 45. Holdings of 54. Locality, number of plots and area.

Locality	No. of plots	Size of plots (a)	(b)	(c)	(d)	Total
A	2	4 tm.	4 tm.	-		8 tm.
B	2	30 tm.	½ tm.	-		30½ tm.
C	3	3½ tm.	1 tm.	3 tm.		7½ tm.
D	4	8½ tm.	2½ tm.	2½ tm.	4 tm.	17½ tm.
E	1	7½ tm.				7½ tm.
F	1	3 tm.				3 tm.

He had six children (541-546) equally divided among the sexes and the amount of land given to each child varied enormously (Table 46), the daughters receiving small portions, the eldest son somewhat more, while the two younger brothers received two-thirds of the total land, which they work in partnership. The two elder daughters each married men with substantial land holdings. Their sister married a butcher who normally takes no part in farming but did work on the land during the recent war. At present the butcher's land is worked by 543 on a profit-sharing basis. 543 became independent of his father at an early age and has acquired a not inconsiderable farm (52 *tmien*) by purchase from his wife's family as well as from his father either direct or through siblings. These facts doubtless explain the inequality of the father's sub-division, and 173 423* 596

3 [i.e., The third generation of the family under discussion -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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the portion which 544 and 546 work jointly represents the remnant holding which they and their father worked jointly after the other children had received land. Some of it is still held by the father who takes a nominal share of the profits.

Table 46. Allotments to each of 54's children, showing plot number and areas which each received.

541 d	542 d	543 s	545 d	544 s/546 s
pt. C(a) 1t.	A(a) 4t.	pt. B(a) ½t.	pt. D(a) 3½t.	pt. A(b) 4t.
D(d) 4t.	pt. B(a) ½t.	pt. C(a) 1t.		pt. B(a) 29½t.
		pt. D(a) 1½t.		B(b) ½t.
		E 7½t.		pt. C(a) 1½t.
				C(b) 1t.
				C(c) 3t.
				pt. D(a) 3½t.
				D(b) 2½t.
				D(c) 2½t.
				F 3t.
8t.	4½t.	10½t.	3½t.	80½t.

Table 46 shows the extent to which plots have been sub-divided. On the whole the smaller plots have passed unbroken to the children (e.g. A(a) and (b), C(b) and (c), and D(b), (c) and (d)) but so has E(a) which is a fairly large fertile plot. Plot B, also, is little broken, though 542 and 543 each have a small portion for the supply of fruit to their respective family tables.

The fourth generation received paternal land according to the same patterns as the preceding one, and a similar generalisation applies to their acquisition of new land.

Table 47. Acquisition of new land by generation IV.

Groups	B	C	D	E	Total
From grandparent	4½		3½	17½	25½
Marriage	34½	26½	72½	151½	183½
New tenancy	35½	3½	5½	20	65½
Purchase	7			51½	58½
Miscellaneous*				5½	5½
Total	81½	30½	81½	244½	338½

*In trust for step-son.

The proportions acquired in the different ways have however changed substantially. Some indication of the extent to which the family are now integrated into the local community may be had from the amount of land now acquired by

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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marriage (60 per cent. of the total), but there are now a greater number of family members interested in land - 31 in all, though only 22 have holdings of a size likely to produce an adequate family income. The net per capita change over the generation is a significant reduction in the area added, especially in the area added by new tenancies which in generation III resulted in an increase of 93¼ *imkeen*. Further, the increase indicated in Table 47 is significantly influenced by a tenement newly entered by one member of the family (2130) which, in one large block of land, amounted to 28½ *imkeen*. All other new tenancies were relatively small pieces of land. The same applies, in fact, to all the land added at this time and, while land held by the family is gradually becoming an increasingly significant proportion of the total land in the locality, the outer spatial limit of new acquisitions is becoming increasingly wider (Fig. 139).

Naturally, generation V, some of whom are still babes-in-arms, has not yet been long enough active in the field for any clear patterns to show, but some transfers of land have take place. There does however seem to be evidence of an increasing proportion of children receiving only small garden plots from their parents, their major source of income being clearly outside farming. Throughout the period considered, 'garden land' of this sort has increased, though the pattern is obscured by overlapping generations (*e.g.* group C, generation III was somewhat younger and therefore later developing than other groups).

In the foregoing section, the landholding history of a family has been examined in historical depth. Both the methods of acquiring new land and the means of sub-dividing land already held are seen to result in more scattered and smaller plots. Although all children have pre-emptions to their parents' land, by no means all such rights are in fact taken up. In general, sons receive more land than daughters, while dowry land, so-called, is seen to have rather a more special function than that term implies. Although the availability of land has varied from period to period, energetic individuals seem always to have been able to build up their holdings to a viable size, partly perhaps by judicious choice of a marriage partner. Nevertheless, since c. 1870 there has been a general decrease in the size of farm.

Much of this evidence confirms and in part explains the trends observed in the general statistical material and the study of the Żebbuġ-Siġġiewi area. The legal evidence, which as was shown earlier allowed for the possibility of extreme sub-division, is only relevant so far as individuals and economic conditions enforce such extremes. In so far as law and custom support the maintenance of a family's control over land, field evidence suggests that law and custom prevail, for very little land entering the family is subsequently lost. On the other hand, attempts to sub-let outside a family group are seen again and again to result in forfeiture of land which our expanding family were quick to seize upon.

In conclusion, it must be pointed out that, although fragmentation has not proceeded to a degree made possible in law, it has developed with fair rapidity during the period of this survey. Had fragmentation proceeded everywhere in the Island at the same speed in longer-established farming families, it would certainly have reached a more critical phase than it patently has. There seem to be three possible explanations of this apparent contradiction. Firstly there may have been some factor, as yet unknown, which inhibited considerable general fragmentation and which ceased to operate as from 70 or 80 years ago. The nineteenth century development of Government Lands, or some element in the emigrating pattern may be involved. Secondly, there may be a socio-economic limit to the process which our family has just reached, bringing it into line with conditions in older families - extensive inter-marriage may be a factor here. Or finally, there may be special forces within a developing family unit, perhaps not unrelated to the spirit of determination which led G and his sons with little capital to take upon themselves the task of restoring 100 *imkeen* of storm-ravaged land, which would not apply to other groups. Certainly some individual members of the family studied display a peasant-like devotion to the soil which is becoming increasingly rare in Malta.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

Notes on Two Land-Holding Patterns

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Fig. 104F provides an example of extreme sub-division of the land in an intensely cultivated area, where irrigation water is readily available. The map covers some 324 *tmiem* (90 acres) and is divided into no less than 333 plots, separated from each other by stone walls, by tenancy boundaries or by both. The tenancies of 250 of these plots have been identified from the maps of the Land Register and these are worked by 69 individual tenants. Forty-six tenants, working 194 plots, are registered in the parish of St. Paul's Bay, 13, working 48 plots, belong to Mgarr and 8, with 19 plots, to Mellieha. The distribution of plots among the tenants is as follows:-

Number of plots per tenant	Number of tenants	Total number of plots
1	29	29
2	9	18
3	4	12
4	8	32
5	3	15
6	3	18
7	0	0
8	4	32
9	1	9
10	4	40
11	0	0
12	1	12
13	0	0
14	3	42
	69	359

Fig. 116E illustrates a tenancy pattern in complete contrast to that of Fig. 104F. In this dry-farmed area, plots are much larger, averaging 3.7 *tmiem* (approx. 1 acre), compared with 1 *tomna* in the Wied tal-Pwales sample. Individual tenants generally work a number of adjacent fields and sub-division of fields is extremely rare. The area involved in this case, is approximately 414 *tmiem* (115 acres) divided into 112 plots worked by 50 tenants. The land lies wholly in the parishes of Attard and Qormi, the boundary running north-south along the central track, but the farmers are registered in a number of neighbouring parishes:-

Parish	Tenants	Plots
Attard	7	13
Balzan	12	3
Birkirkara	16	35
Kwarun	2	3
Lija	1	1
Msida	1	1
Qormi	31	56
	50	112

This distribution indicates the deficiencies involved in statistics collected on a parish basis.

The distribution of plots is as follows:-

Number of plots per tenant	Number of tenants	Total number of plots
1	24	24
2	10	20
3	7	21
4	3	12
5	3	15
6	2	12
7	0	0
8	1	8
	50	112

[See p. 262 — Analyst]
[See p. 260 — Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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[P.317]

Chapter X

THE PRACTICE OF FARMING

We have considered at some length the physical and social environments in which Maltese farming exists, the distribution of crops and of agricultural regions, and examined some of the physical and legal characteristics of the land holdings in which the land is worked. There follows a more systematic statement and a tentative interpretation of farming practice, and studies of the Maltese countryfolk (Plate XVIII). 128

A. Livestock

Livestock in Malta, with the exception of the wandering, wasteland-feeding, herds of sheep and goats, is rarely seen or heard. Cattle, pigs, poultry and rabbits are all kept in stockyards or enclosures, and horses, mules and donkeys, when not working in the fields, are stabled the whole time. Their near invisibility has caused us to omit mention of them in earlier sections. As noted in Chapter VII, the Maltese farmer, faced with land shortage as a result of the high population density, has chosen to cultivate stall-fed fodders as short-rotation crops rather than to grow pastures or perennial forages. It is difficult to believe that he has not made the correct choice if the criterion adopted is that of intensive and continual use of difficult land resources and the minimising of waste. 231 [246] 231

Numerically, goats are by far the most important (Plate XVII). During the past century, they increased tenfold in number, a fact which marks the amazingly rapid increase in milk consumption, but in the last decade the trend has been reversed. The indigenous breeds, highly regarded in the Mediterranean up to the close of the eighteenth century, have now almost entirely been replaced by crosses with introduced British Saanen types. These crosses, in which Saanen blood remains dominant to the third or fourth generation, are hardy and prolific milkers, considering the quality of feed. Goats have remained important not only because they still supply about 40 per cent. of returned milk sales (and a large amount produced domestically and sold illegally), but also because, together with sheep, they utilise the great extent of wasteland as natural pasture. Some feeding on field grown forages is practised - during the survey such feeding was observed at Marsisi on broad beans and at Wied Babu on sulla, for example - but this is rare. 234 311 [232] [246]

Land unusable for cultivation, and which makes up over 30 per cent. of the total area, provides the basic forage ration. Breeders and kids are given supplementary feeds of beans and hay crops. Although, therefore, goats are theoretically poor converters of fodder into milk, they cannot be displaced by spilèh cows without at once offending the tastes of most Maltese for goats' milk and cheese, and making the uncultivable land almost totally unproductive. Sheep, somewhat less numerous than pigs, and by far less valuable, occupy the same ecological niche as do goats. Used domestically in many areas for milking, and by far the cheapest meat animals, these predominantly hairy rather than woolled sheep, of a strong German strain, are one of the 'crops' of the barren lands. In the absence of statistics of fodder consumption, the only evidence available is that obtained in interview. It would certainly seem that sheep and goats use much uncultivated land in their demand for feed, and are almost the only media for obtaining any yield at all from one-third of the land of Malta and Gozo. (See also Chapter X C.)

Pigs, numerically the most important meat animals, are almost all of recently introduced breeds, the English Large White in particular, Berkshire, Wessex Saddleback and Middle White have been tried, but the Large White Yorkshire, even when bred for lean meat to an average weight of 180 lb., has 231 232

A [See page 256 --Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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231 proved its superior adaptability. An interesting point is that, before 1914, Serbia
232 and Croatia exported to Malta large numbers of pigs for fattening, while Yugo-
[431] slavia is today importing Large Whites as breeders from this country. It is now illegal to use other than pedigree boars for breeding, and the success of the Agricultural Department and the relative enthusiasm of the Maltese farmer in raising pig production standards have made Malta self-sufficient in this respect at least. Local grain and imported beans form the basis of feeding stuffs given by the best farmers. Animal slaughterings now average about 30,000 head per annum.

23 Of the total cattle population of some 6,000 in Malta and 3,000 in Gozo, nearly 30 per cent. are milch cows. This proportion has increased steadily since the first introduction of milch cows in the early years of British occupation. Before 1800, the indigenous Maltese breed, raised as general purpose stock in normal [177] peasant tradition, alone was of importance. During the nineteenth century, specialised breeds were slowly introduced, a process which culminated in trials with Swiss Brown, Polish and Jersey cattle during the 1920's and '30's. By 1939, the cattle were mainly of mixed blood with the older strains predominating, and those still found are rapidly being displaced because of their low milk yields of some 1 to 1½ gallons a day. The only surviving registered Maltese bull is to be seen on a farm at Binġemma Gap. In the post-war period, imported Ayrshires, British Friesians and Durham Shorthorns have proved very successful and popular. The Friesian strains in particular are very effective for crossing, important in that most country herds are still of mixed blood. A typical composition was noted in a stockyard on Delimara Peninsula - 13 milk cows and three heifers consisting of pure polled Maltese, Friesians, Friesian/Maltese crosses, Ayrshire/Maltese crosses, together with seven Friesian and crossed Friesian [439] calves. Store cattle, of which over 3,000 are annually imported for fattening, are of various breeds, and come in the main from within the Mediterranean region.

231 This cattle population, which supplies half of the total production of milk in
84 Malta, and approximately two-thirds in Gozo, as well as over 75 per cent. of the beef consumed, is a very special element in Maltese agriculture. The imported store cattle have but to be fattened for slaughtering. Trustworthy statistics are lacking, but it would seem that over one-half of the imported fodder is consumed for this purpose.

The milch cows are given a maintenance ration of sulla and other leguminous fodders, and a production ration of imported beans, grains and cake. Carob beans and chopped prickly pear are sometimes used, and *oxalis cernua* may also be fed in moderation.

231 This large demand for fodders has so far been met by maintaining at high
234 level the production of leguminous and grain crops. Only in recent years has it
246 become economic to add high protein feeds. For social and health reasons the human consumption of high protein foods, milk in particular, has been encouraged. It has therefore often been suggested that further concentration on production of forage crops is necessary.

It is probable that such a policy would be both uneconomic and impracticable. In the first place, as long as it requires an average of 6 lb. weight of fodder protein to produce 1 lb. weight of animal food protein, then any country with restricted land resources has to look twice at the wastage involved. Such a country, having to import either animal products or vegetable products, or even both as in the case of Malta, has little to gain by specialising in a production technique in which over three-quarters of the crops grown and imported for feed merely go to maintaining livestock in existence. Thirdly, since that land now grazed by sheep and goats is virtually unusable in any other way, they cannot be simply replaced by cattle. More cattle would mean less arable farming of food crops and this would entail either the loss of potential vegetable exports from irrigated land or, more feasibly, the improvement of arable dry-farmed crops, e.g. sorghums in place of barley.

The impracticability of a policy designed vastly to increase forage production may be proved as follows. The growing of perennial fodder crops is out of the

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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question unless a complete agricultural revolution committed Maltese farming 231
to thorough-going dairy farming specialisation. Such specialisation, given the 234
climatic and physiological difficulties, would not be easy to justify. A very considerable seasonal glut of milk exists between May and August at present, and 246
the Milk Marketing Undertaking cannot handle the flush. This degree of fluctuation could be lessened but not removed. Costs of production are such that not only would exports be uneconomic but imported tinned milk can and could considerably undercut home production. Local consumption of fresh cows' milk could not be expanded much more than 10 to 15 per cent. above the present level which is already the highest in the Mediterranean, as long as tinned milk is more easily preserved, and as long as the rural community keeps goats and sheep. The banning of milk imports and of the production of goat milk would hardly be in the consumer's economic or dietetic interests.

Horses, mules and donkeys, some 6,500 in number, are still very important 492
as work animals. For farm transport, they can only be replaced by the internal 407
combustion engine purchasable only by the more prosperous cultivators. Produce collection by merchants' lorries is increasing as also is the use of hired tractors for cultivation. The numbers of these animals is unlikely to decrease quickly outside the urban areas because of their usefulness in tilling difficult land.

Of the remaining small livestock, rabbits and poultry already make a very 231
large although immeasurable contribution to food supplies. Improvements in 235
quality could be obtained if farmers' interest was aroused. At present, mixed breeds of poor poultry are commercially uneconomic.

In conclusion, we must return to the vexed question of dairy-farming and 234
milk production in Malta. In 1950, the Director of Agriculture (1) put the 654
question: 'Under prevailing conditions in Malta and Gozo, which is the more profitable animal to keep? The cow or the goat?', and followed with the statement: '...no accurate answer backed by accurate scientific data has ever been given'. The same impasse had often been noted before, for example by Dawson Shepherd (2), and Stockdale (3). An unpublished report on Maltese Agriculture by a visiting F.A.O. commission (4) similarly found itself at sea in the absence of any firm information. In 1956, the complexity as well as the obscurity of the situation was manifested in a Report on the Dairy Industry by G. W. Ford (5). In this study, reference is made to the different conclusions reached by independent observers, and to intermediate suggestions made by Marshall (6), one of whose remarks: 'I simply cannot visualise hygienic milk production by the peasant farmer in Malta', our observations would endorse.

Milk-production in Malta is no longer a matter of economics but, as in many countries, is affected by social and dietetic policies. Brief mention was made in Chapter VI C of the problem of the incidence of undulant fever and its association with milk infected by *Brucellosis Melitensis*. Some 20 per cent. of Maltese goats are thus infected, and any dietetic campaign to encourage the drinking of milk, particularly important in child welfare, must take account of this. Few cows are thus far infected and elimination is easier. The problem that emerges is therefore both economic and social in character. It is felt by some that reliance on imported tinned milk is one solution but by others such a suggestion is regarded as humiliating. Another possible line of action is to replace goats with milch cows, and in 1956 a system by which herdsmen were offered one Dutch Friesian heifer in calf for 12 diseased goats actually came into operation. The third possibility is to accept the position as it exists at the moment, or slightly to modify it, and centralise milk distribution thus enabling pasteurisation. This too has been done. Even now however, the cost of tinned milk imports, the cost of producing cows' milk, the surplus of goats' milk, all these as well as the land use point mentioned earlier, still remain to be dealt with. As we shall see, the market for milk called into being as a social measure is now the mainstay of many farmers of all grades. The development of the centralised agency, the Milk Marketing Undertaking has been accompanied by a guaranteed price system. Some 50 per cent. of all milk producers have, as a result of this organising of wholesale purchases, formed their own union the K.M.H. - '*Kumpanija Mallija*

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Ial-Balib'. These bodies have introduced some constant elements into an otherwise chaotic situation but this has also implied a certain rigidity. Sonce the costs of milk production are not accurately known and the costs to the National Economy are ignored one now has an artificial market with artificial prices which must be maintained to prevent economic disaster on the farms. (For such information on production and marketing as is available, the reader is further referred to Chapters X D and X E.)

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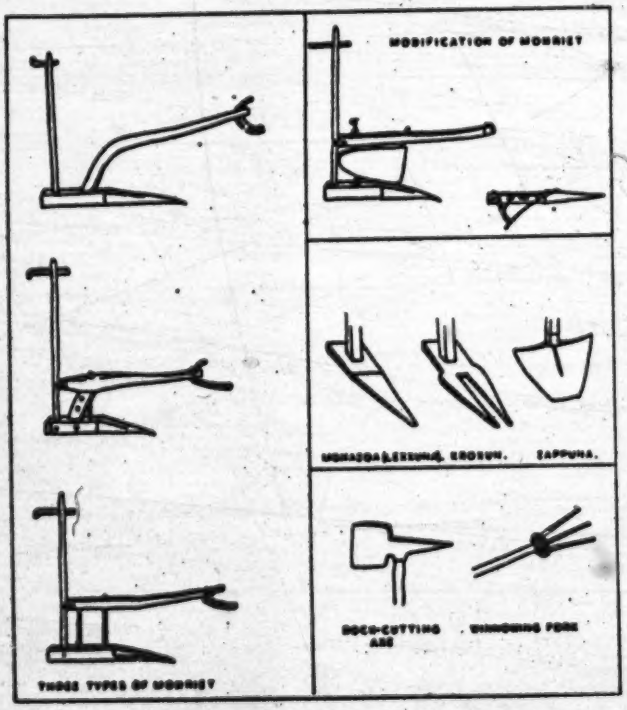

Fig. 140 Cultivation Equipment.

B. Cultivation Equipment and Tillage

Of the implements observed in Malta, the traditional types of plough, hoe, sickle and harrow are of the same genera as those to be generally found in the Mediterranean region (Fig. 140).

Ploughs are of the *Aratrum* or *Ard* type, steel tipped wooden wedges, devoid of cutting edges and having very restricted powers of furrow making or inversion - *moldriel*. None of those observed had lateral 'ears' or 'wings' but apparently ards thus equipped are occasionally used. There are various sub-types with differing arrangements of beam, body and handle but no constant rational relationship between these sub-types and local environments could be observed. Prices range upwards of £4 10s. 0d. Iron or steel tips for the body cost about £1. One interesting modification of the plough is manufactured at Zurrieq. On top of the basic beam and body is fitted a movable double mouldboard of which either or both breasts can be brought into operation at any one time. Ridging and left and right furrow inversion are therefore made possible. For those areas where furrow inversion is practicable such a cheap, light multi-purpose implement would be very valuable, and the development of such improvements might well be encouraged by official approbation.

Hoes are manufactured in four main types. The heavy spade type, the *Zappuna*, is generally used for soil trenching in preparation for manuring. The effort involved tends to restrict its use. The small, single tined, wedge-shaped hoe, the *Mghazqa* or *Lexxuna*, is a general purpose implement that is replaced under damp and cohesive soil conditions by a forked, two-tined variety, the *Kroxun*. A three-tined hoe is often used, together with the ard, for potato lifting. In general, each cultivator possesses a selection of different types of hoe, necessitated by the variety of manual operations he usually has to perform and made possible by the reasonable prices of the implements (prices range from about 16s. for the single-tine, to 18s. to £1 for the spade hoe).

The sickle in general use is a small, smooth-edged type costing about 12s. 6d. The small number of sickle types observed may result from the widespread practice of pulling rather than cutting green fodder. Traditional harrows are almost invariably of the Mediterranean and Asiatic type, harrows cum levellers and seed coverers. Those observed were triangular and stone weighted. When manufactured for the purpose they were usually constructed of ash and had removable tines. Without metal tines, the cost is about 50s.

These implements, of which illustrated examples are given (Fig.140), have already to some extent been displaced by imported newer types. Most farmers who possess fields which are at all accessible to tractors now periodically hire contractors to plough the land with mouldboard or disc ploughs and even, in some areas, with deep digger-ploughs. Where plots are small or the terrain difficult, then rotary cultivators are hired or purchased. These latter machines, in spite of their relatively high cost - usually over £200 in Malta - are amazingly popular and are more and more replacing the *ard* and the hoe. The reasons for, and implications of this popularity are examined below.

The spade proper is hardly ever used, and its absence is associated with the reasons for the survival of the *ard* plough. Small, light, flexible, metal harrows are to be found. Entirely imported, their only advantages are their flexibility on rough ground and ease of draught. They are, on the other hand, more easily damaged and more difficult to repair than their wooden prototypes. Other equipment includes a great range of fixed and movable adjuncts to farming, all but one class of which are constructed rurally from local materials. The exceptional group is that connected with irrigation and includes windpumps and small diesel engines. Threshing and winnowing, traditional style, needs no more than a rock or *lorbe* (beaten earth) floor and asses or horses for trampling, baskets constructed of local cane, and simple wooden winnowing forks. Of recent years, centralised threshing by contractors' machines has almost entirely displaced the older method in all but the more remote western regions. Canes, grown in slightly marshy conditions in wied floors, provide the raw material for wind breaks, covered forcing beds, crop supports, etc.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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for wind breaks, covered forcing beds, crop supports, etc. Livestock harness is simple in type consisting of head harness and collar. Working bullocks, now rarely used, are also equipped with collars for traction but the guiding reins are attached to the horns. Country carts are unsprung, wooden frames resting directly on the metal axles. That the ruggedness of their construction is only equalled by the toughness of the draught animals is evinced by their presence on places such as Dingli Undercliff, or the cliffsides of the Wied il-Luq (Buskett).

The solidly built stone huts or *orfa* that are to be found on most holdings may be regarded as part of the farmers' 'equipment' rather than his habitation. The simplest and most numerous are simple one-roomed cubes, some five yards square, strongly constructed, usually of worked stone blocks with wood and *torba* roofs. These 'blockhouses', for such they appear, serve as storehouses for implements and crops, for guns and birdcatching equipment, as well as for shelter during the 'siesta' hours and bad weather. Their cost in construction labour, and the pride that does into the simple furnishing of what is the farmers 'den', as well as the deceptive appearance of dispersed settlement that they give, suggests that further investigation into their origins might prove valuable. In general terms, they seem to be a natural response to the marked concentration of settlement in the casals. They are far less numerous in the western region of more recent and dispersed settlement. The larger, two-roomed and two-storied types are used mainly as summer working residences, when a whole family may move out of its casal to the main holding.

These implements and types of equipment are one facet of the complex of traditional cultivation techniques - techniques based on the intense and continuous application of uncosted hand labour. A brief examination of the working characteristics of some of the implements is a necessary introduction to a discussion of general cultivation techniques.

The *moħriet* (Plate XIX)is used as an animal-drawn hoe rather than as a plough proper. It is light and can be carried by the cultivator along narrow field paths and across rugged terrain. Its negotiability is limited only by the ease of access demanded by the draught animals. The 'rotavator' (Plate XX) alone of modern mechanical implements can rival it in this respect. On coarse soils, often only a few inches deep, cross tilling by hoe or *ard* seems perfectly satisfactory for tilth making. A vertically applied tool such as the true spade cannot be utilised in such soils, while all but the simplest mouldboard ploughs are too clumsy for use in small terraced fields. Both *ard* and hoe are used in garden rather than field style and their only disadvantages lie in the slowness of the work performed. Here lies the especial advantage of the rotavator that can, under reasonable conditions, be used for tilling six *tmien* of land a day as compared with about two or three for the *ard* and one for the hoe. (Figures are necessarily approximate averages.)

Cultivation techniques and the farming landscapes which they have produced are now in a critical stage of development. For millennia, a slowly increasing population has been utilising the natural land resources more and more intensively and also supplementing them by artificial works. Until the early nineteenth century, social and tenurial obstructions to full land use on the one hand, and wealth derived from the overseas possessions of the Knights of Malta on the other, little affected the basic land hunger of the rural community. During the period of British occupation, however, externally derived income has brought with it more and more non-agricultural activity. Opportunities for non-farm work have increased and so has socio-economic dissatisfaction with arduous and limited rural life. The stage has now been reached at which land reclamation and land abandonment, intensification of effort and neglect, are proceeding simultaneously. An examination of those landscape features which are products of farming techniques suggests that this stage is now critical.

Land reclamation and the extension of the cultivable area are still going on. At several points on the Delimara peninsula, material is being carried from the cliff foot and from old huts and dwellings and spread over the existing thin and discontinuous soil cover. On this, sulla as a soil building leguminous crop

[see page 306 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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is then sown. Much of the resultant poor crop is hoed in, and then the humus enrichened tilth ploughed and put under rotational farming. At ta'Denfila, on the Upper Coralline tablelands, terrace walls are constructed from the larger boulders, and soil garnered from crevices and hollows then packed along and above the new walls. Fruit trees are planted in this new soil zone so that root development will both hold the soil and accelerate disintegration of the underlying rock. Stones are cleared from the remaining area, the rock floor chipped away, and leguminous crops such as broad beans are sown. When chemical weathering has sufficiently deepened the thin soils, and the humus content has been increased then normal ploughing is introduced.

On a smaller scale may be observed the building up by hand of 'perched' fields which, as at the Wied Buqana (103)* north east of Mtarfa, may stand 6 or 8 feet above neighbouring fields and which, with their red soils, contrast markedly with the surrounding white and yellow lands. Here, the material is derived both from Wied Qiejgha silt and from town refuse. Not only in these areas but in many others as around the Wied il-Hallelin in the Southlands, on the interfluves of the Wieds Dalam (274) and Has-Saptan (285), and near Armier Bay (6) in the north-west, this age-old land making can still be observed. Less important but still practised, as near il-Marnisi (275), is the process of chipping small fields out of the solid rock, and the slow conversion of inorganic aggregates, capable only of hydroponic use, into real soil. (A European analogue can be found in Spanish Galicia.)

Distinct from these creative processes, are the techniques of laboriously utilising to the maximum the existing natural resources. First there is the practice of using soil pockets and crevices which for the most part would be quite uneconomic to work on any commercial evaluation of effort. On all the Upper Coralline lands small pockets of weathered material - Terra Rossa - lying between great rock platforms and boulders are remarkably well utilised. Barley, peas and broad beans are typical crops as at Xaghra tal-Buskett. At il-Wejdar peas are sown in karst crevices and give surprisingly good yields. Larger clefts and pockets are usually used for tree crops. Carefully tended peach trees may be observed in a 4-feet wide and 14-feet deep landslip cleft on the Upper Coralline cliff south of the School Mater Admirabilis (Rabat). On the Victoria Lines Scarp at Targa Gap (98) a solitary lemon tree can be seen, carefully sheltered by cane fences in a small soil pocket surrounded by a great area of karst.

These are minutiae, but they illustrate the high intensity of resource use. Larger depressions in the Upper Coralline as at Hofret ir-Riza (75) (Fig. 111C) have been given special attention. Here, irrigated crops are intensively grown in the deep soils of what is mainly a shallow solution hollow cum collapsed cavern. Dry wied basins having subsoil water as at the eastern Wied Musa (Fig. 102A) form oases in barren karstland. On a still larger scale there are basins such as that of ta'Saliba (34) (measuring about 400 yards by 800 yards) in which dry and irrigated cultivated lands are inextricably intermingled with small karst hills.

A different type of utilisation is that which notes and takes advantage of minor differences in environment. Where wied channels are wet and marshy for most of the year, as in the Upper Wied ta'l-Isqof (138) and in lower Wied Has-Saptan (285) then canes, bullrushes and sward grasses are encouraged, tended, and cropped. Where, on the other hand, wied channels are wider and less well watered, then cultivation has spread down from the neighbouring terraces. Protection from storm-water is obtained by the building of longitudinal protective walls in the channel itself as in parts of the Wied is-Sewda (194) and the Wied ta'San Martin, and Wied ta'Ghajn Rihana (43). Occasionally, as in the Wied tal-Qiejgha (99), a further lower water channel has been artificially cut in the wied rock floor for extra protection.

Most of the storm water dams and soil traps are carefully sited at nick points in the long profiles. Examples of this conservation work may be found at

*A number in brackets following a place name refers to Figs. 69 and 70.

242 311

[See pp 192 and 194 -- Analyst]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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242 311 the heads of Wied Babu (219) and in the Santi Gap (57) in Malta and in the West-Central Region of Gozo. In such topographical pockets, the building of soil trap walls is sometimes extended to form walled orchards as at id-Dahla and the head of the Wied ir Rum.

241 311 When we turn to observation and consideration of cultivation reactions to minor topographical and geological features we are further reminded of the special relationship between tillage techniques and the soil. Bearing in mind the points noted in Chapter III B and the picture we have drawn of the physical and social environment in which Maltese agriculture has developed, we are forced to the following conclusions.

The economic necessity for the utilisation of virtually all land resources and indeed for creating some of them, together with the physical need for basing all farming practice on soil and water conservation techniques, have until very recently rigidly controlled the details of tillage. Fragmentation, a perfectly rational response to circumstances, has intensified the physical sub-division of the land. The majority of fields in Malta and Gozo cannot easily be worked except by small highly mobile implements. In the conditions described above and in a climate which makes possible a great crop range, implements must also be capable of a great diversity of application. In order to keep up the terraces, work the fields and succeed in maintaining and even increasing the area of cultivable land, the cultivator has been committed to unremitting and arduous manual labour. His basic tool is the hoe, his natural development of it the non-soil-inverting *ard*-plough.

The recent removal, by the creation of new real and psychological opportunities, of part of the pressure that has long kept the farmers on the land has altered the traditional picture. Cartographic evidence of the 25-inch to the mile maps, surveyed in the 1880's and 1890's, shows that since that time little waste-land has been improved. The only known large-scale change in field patterns occurred during and after World War II in the central lowlands of Gozo as the result of airfield construction, but holding fragmentation has re-imposed sub-division on the landscape. Occupational statistics and case-study evidence all point the same way. As a result of this release of pressure, land neglect and abandonment are now irregularly removing the extremes of control of cultivation. Even more important, Malta has been affected by the new evaluation of tillage techniques which has characterised so much of the world. Under modern conditions, most improvements in cultivation techniques have been deliberately designed for the increase of productivity on the better and more easily worked lands. Rural depopulation of the hard lands which gained such momentum in nineteenth-century Europe is an inevitable concomitant of such increases in productivity and of the accompanying demands for higher standards of material consumption and an 'easier' life. In countries such as Malta, this means that a new equilibrium has to be established, existing and new techniques and implements have to be evaluated against established environments and actual or potential changes.

241 311 435 [242] [434] Three examples from case-studies (Key letters refer to Chapter X E) can illustrate what this means in farmer's terms. The first (A, p. 337) concerns a part-time farmer in Region A II, Mellieha Isthmus. This cultivator corroborated other evidence that in the nineteenth century it was still common for 'dry' fields to be created out of wasteland. More recently it has only been economic to make irrigable fields. The method is virtually the same in either case. First a terrace is cut into the rock slope, and the stone rubble is then built outwards in 'made-ground' and held in place by a terrace wall. Soil, usually now from a building site, is then laid over the rock platform and stone infill. Such a field 2 *tmien* in extent in 1951 cost £150 in construction (almost entirely in labour) plus £50 for the transport of 20 truckloads of soil. The gross receipts from this irrigated *campe artificale* were £60 and £38 respectively for the first two seasons. A generation previously, such work would have been done more slowly by full-time farmers who themselves would have garnered the soil, but the market for irrigated vegetables would have been smaller. A generation hence, a cultivator will add to the costs of construction all the at present uncosted labour expended

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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by himself and will think of net profit on his sales rather than of gross receipts. 241

The second example is from a case-study (J. p. 342') of a full-time mixed farmer holding 33 *tmien* of dry land (three blocks of six field plots) in Region C XX a, the Mqabba-Kirkop Plain. During the last 20 years, this farmer has built up a herd of 13 Maltese Friesian cattle including ten milch cows from a flock of six goats. Before World War II he relied on crop-sales from arable land. Now approximately half the cultivated area is given over to fodder production. Although by Maltese standards this farmer is enterprising, knowledgeable and possessed of much more than average capital, he has no mechanised equipment for tillage but relies on contract work. Each year a tractor plough and rotary cultivator are hired at a cost of between 15s. and £1 per *tomna*. The farmer still differentiates very clearly between the quality of different parts of his land, on the basis of a soil depth which varies from 8 inches to 2 feet, and on soil type distinguished by colour. Nevertheless, since he is now only really interested in livestock, and regards even fodder production as uneconomic, he has lost interest in arable farming and tends to neglect the poorer land and think of disposing of the other. This man is typical of many of the better class farmers in that the old niceties of tillage are forgotten as commercial considerations predominate, these latter a resultant of social and economic change in the Islands.

Lastly we may consider the extreme development, the farmer turned machine contractor. Only half the age of the farmers already considered, this man is much more aware of general developments in the agricultural scene, partly as a result of seven years spent as an 'emigrant' in Australia. Patrimonial land is left to the attention of other members of the family, and he is only concerned with investment in machinery for hire. This contractor now possesses a lorry, a Ferguson hydraulic lift tractor, a hydraulic shovel, triple-disc and mould-board ploughs, a rotavator as well as numerous accessories, and wants to purchase a thresher and a small combine harvester. The whole cultivation emphasis is put on mechanical effort and its ease of application. Deep-ploughing is advocated wherever possible even though he admits 'there may be drawbacks'; no qualms are felt about knocking down walls to gain admittance to fields, and considerable impatience shown towards traditional agrarian and social values. This man even complained that he was not allowed to plough on Sundays. One of his ambitions is the quintessence of the new attitude towards cultivation. It is to have a farm of 30-40 *tmien*, all in one block with no patch smaller than about an acre, the whole to be workable by tractor, thus making hand labour unnecessary, and accessible to heavy machinery. The holding should have its own farmhouse and be near to a market such as Żabbar. In this man the mechanical revolution in cultivation in Malta is epitomised, contrasting strangely with an attitude met at Rabat that the wheelbarrow is too technically revolutionary to be acceptable - 'it is not used here!'

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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C. Husbandry

241 In this section, a brief examination is made of those elements in agricultural
128 production not previously considered. A methodological problem arises from the fact that, as should be abundantly evident, farming in Malta is a complex in which it is most difficult to isolate the various elements. The method adopted here is to examine in general first arable farming, and then livestock. In the subsequent sections, an attempt is made to examine the general economic characteristics of Maltese farming and then to define the types of farms which exist in the Islands, with particular reference to the island of Malta.

242 As in all non-industrial countries with high population densities and limited resources, a paradoxical situation may be observed in Malta. The intensive application of manual labour and careful observances of the minutiae of traditional techniques are found alongside some instances of land neglect which offend all the canons of good husbandry. On the one hand are observed careful tillage sequences, a first shallow ploughing or hoeing to kill weeds, a second deeper ploughing one week later to break up the surface crust and 'stir' for aeration of the soil to a depth of some 6 to 9 inches, and a further ploughing just before sowing to produce a fine surface tilth. On the other hand can be seen hoeing and ploughing during periods of high wind during which steady and large-scale wind removal of the finer aggregates takes place. Similarly, single trees can be almost coddled, while orchards are most often neglected and, while village refuse and animal dung is carefully worked into the soil, little effort is made to discard inorganic rubbish or diseased and seeding crops and weeds.

This paradoxical situation is most clearly defined in the attitude to weed and pest infestation and to the use of artificial fertilisers. Weeds of many types occur everywhere, and their eradication is manifestly impossible as long as the areas of wasteland to be found in every region provide safe centres for propagation and diffusion. The very walls of Malta which line almost all the fields and roads shelter weeds and pests. Even if eradication is impossible control is not, and the inadequacy of present husbandry is a measure of difficulties both mental and monetary.

The most prevalent and damaging weeds are broomrape and *oxalis cernua*. The former is indigenous to Malta as a field weed, particularly in association with cereals and broad beans in the dry farming area. On the thin dry soils of these regions, broomrape competes, only too successfully, for the limited water available and for plant nutrient material. The total effect on yields and the negating of much of the effort put into leguminous crop rotations must be very serious. Chemical control seems unlikely, and the cultivators themselves are aggravating rather than ameliorating the position. One cultivator interviewed in Region C XVIIIa epitomised the situation. Complaining that 'the weeds are pushing us off the land' he pulled his sulla crop, carefully leaving his wild oats and broomrape to seed freely. It was not surprising that his immediate neighbour had given up farming.

Many similar situations may be observed. Partly they are to be explained by the diminished actual and psychological pressure on land resources. In the main however they imply a basic parochial ignorance left as a legacy from the more primitive past. A farmer interviewed in Region C XX e clearly illustrated the nature of the mental problem. On being remonstrated with, because while pulling his rust-infected broad beans he left the numerous broomrape plants to seed freely, he professed astonishment at our ignorance. Observation, he pointed out, showed that the root tissues of bean and broomrape were not only intermingled but conjoined. Obviously therefore *both* plants grew out of the planted bean and surface seeding had nothing to do with the weed infestation. The problem set is how to explain in a convincing manner to a medievally-minded farmer the following: 'The seeds (of broomrape) germinate in the soil if the fibrous roots of a congenial host plant are nearby. Otherwise they remain dormant . . . as long as 13 years. When the primary root or radicle of a germinating seed makes contact with a fibrous root of its host, it forms a nodule of tissue

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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which becomes fused with tissues of the host. New roots and a stem of the parasite develop at that point' (1). The monetary problem results from the fact that once broomrape, or for that matter *oxalis*, infestation is severe, eradication by sterilisation means considerable expense and temporary loss of land.

The position as regards other aspects of phyto-pathology is even more serious. 'An intolerably large proportion of the field crops is being destroyed by pests and diseases' (2). An unpublished interim report of a Plant Disease Survey showed that c. 150 different diseases were found in one season in 1957 (3). Recent work by the newly established Plant Protection Unit indicated in 1958 that not only were old established diseases still virulent but that new ones, virus types in particular, seem to spread to the Islands very rapidly. Thus a fungus infection of grapes observed in August had been identified for the first time less than six months before in France. Pests are numerous and damaging. The only place where the author has ever seen large-scale infestation of a cereal crop by snails was in a barley field near Munxar (Region V) Gozo. They are also very destructive in the environmentally attractive globe artichoke patches found in so many wied bottoms. The Maltese practice of trapping or shooting virtually anything that flies may be amusingly reminiscent of Tartarin of Tarascon, but it does limit the controlling effect of bird life on some pests. Insect pests are even more important, ranging from the lethal onion thrips to the less spectacular but qualitatively damaging Mediterranean fruit fly and tomato red mite.

While it is essential for the sake of the internal economy that quantitative loss of production should be avoided, it is equally important that agricultural produce which might now or potentially be exported should be unblemished and free from disease. Thus the only countries which can offer markets for high priced early potatoes are *ipso facto* those in which regulations governing the health of imported produce are most severe and in which competition is most keen. The Department of Agriculture and more recently the Agricultural Advisory Service are thus confronted by very serious problems. The first step, taken mainly since 1955, has been to establish scientifically observed fact. Thus the phyto-pathological surveys already cited have been made; in 1957 a preliminary report on the meteorological possibilities of operating a potato blight forecasting service was prepared by Mitchell (4), and a plant protection adviser appointed. As Hopkins (5) has pointed out some plant symptoms may be attributable to a 'wide range of conditions varying from soil exhaustion to root or virus diseases'. The soil survey carried out by Lang (6) has considerably increased our knowledge, but more needs to be done before deficiency troubles of all kinds can be overcome. Meteorologically, the obscurity may be illustrated by the confusion caused by the frequent use of the word '*ġlata*' to mean frost or frost damage as well as 'blight'. Sunscorch, particularly through dew globules, followed by moulds which find optimum conditions in the high humidities and temperatures in plant level micro-climates is probably responsible for much of the so-called '*ġlata*' damage. The removal of obscurity by scientific investigation is an essential step but it is one which, figuratively, takes the investigator away from the farmer.

The second type of action required is the examination of crop types and varieties at present grown and the consideration of the possibility of introducing exotic types, varieties and strains. Hypothetically, this is no great problem inasmuch as the farmers of the Islands have in the past apparently shown themselves ready to experiment and able to recognise a superficially 'good thing' when they see it. One has merely to look at the publications of the *Società Economico Agraria* to realise how much experimental work has been carried on by enthusiasts. In 1848, a work on barley and vine varieties was published together with a consideration of tobacco cultivation. So too in other years. In practice many difficulties arise, mainly from the non-traditional nature of the changes which farmers are now being asked to make. Up to the end of the nineteenth century Malta was famous for the production of bitter (Seville) and blood oranges. The decline in the U.K. market for these types has led to the extensive grafting of sweet orange varieties on to bitter orange stock. That change was possible in terms of Maltese traditional husbandry. But as Hopkins

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242 has pointed out (7), any further advance through the introduction of exotic and specially bred more productive varieties needs careful examination in that since 'nearly all citrus... is budded on sour orange stock... there is a great danger of the total loss of all trees should the *tristeza* virus be introduced'. The expertise needed in this type of development is not present in traditional husbandry.

Apart from the ecological and technical problems, lie the economic and social questions. The Maltese farmer is prepared to take experimental risks only so far as he can understand their consequences. Potato cultivation, only developed on a large scale during the last century, is now a very important commercial element on most farms. Having attained a reasonable level of success with Arran Banner as a quasi-early potato, even the most enterprising cultivators are reluctant to extend further hostages to fortune by trying new varieties. The efforts of the Agricultural Advisory Service in the crop selection field (8) are meeting with some deserved success but the nature of indigenous conservatism needs to be realised. Many Maltese farmers achieve reasonable results by the proper use of traditional crops and techniques. In those regions of the world where the level of productivity is much and unreasonably lower, for example in the mountains of Tuscany, or the paddyfields of Vietnam, rapid improvements can be relatively easily demonstrated. When, as often in Malta, second stage development challenges a traditional husbandry which is giving not unprofitable results, then resistance to change is much stronger. From one of the case-studies the common type of social resistance may be thus illustrated. On an irrigated holding carrots proved a profitable cash crop. The farmer was told by a returned emigrant that paraffin spray was very suitable as a weed killer. He chose a small patch, in his own words, 'where no-one could see what I was doing and laugh' and tried the new treatment. Eventually convinced of its efficacy, this farmer was able to observe the slow visual impression made on his neighbours.

Fear of failure in neighbours' eyes has to be put alongside a strangely humble pride which will cause a group of farmers to listen with genuine respect to the suggestions of an expert, to raise no queries, but also to take no action since, although the adviser must be right in general, his knowledge cannot on *a priori* grounds be applicable to anywhere in particular. Thus another farmer, rather than confess to an outbreak of true blight in a field-trial plot of a new potato variety, dug up the crop, sold it and reported total failure.

242 439 Illuminating also is the attitude to fertilisers and chemical aids to husbandry. All artificials are at present imported and used in conjunction with animal manure and town refuse. In 1954, before the main programme of agricultural research and extension, the relative importance of imported fertilisers was as follows:-

IMPORTS OF FERTILISERS 1954

	Volume	Value
Sulphate of Ammonia	1,834,000 Kg.	£40,983
Sodium Nitrate	150,000 Kg.	3,550
Phosphatic fertilisers	2,032 Kg.	43
Potassic fertilisers	2,000 Kg.	51
Other chemical fertilisers	100 Kg.	6
Organic manures	382 Kg.	101
(Copper Sulphate-Bordeaux mixture	-	6,038)

242 The overwhelming reliance on nitrogenous fertilisers is a result not of their proven efficiency but of an incorrect reaction, by cultivators possessing practically no scientific understanding of the processes involved, to new ideas of soil feeding. It seems probable for instance, that most Maltese soils have a low potassic content. Nitrogenous fertilisers cannot give their best results under these conditions and their over-use may result in further impoverishment of

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other plant nutrients. The Law of the Minimum is the ultimate control. Both sulphate of ammonia and sodium nitrate are extensively used on the potato crops although most of the added growth goes into production of foliage rather than of carbohydrate in the tubers. Lastly, under Maltese climatic conditions, the balance between the mineralisation of nitrogen and the maintenance of organic matter in the soil, judging from South African experience, seems hardly to be improved by the simple application of nitrates.

As noted in Chapter III, a great deal more work needs to be done on the problem of availability in the soil of plant nutrients and water before additive needs can be estimated. In the meantime the farmer just does not know, and uses fertilisers rather blindly, often extravagantly, in the same way that he administers the 'medicines' as he usually calls other chemicals. This is a highly dangerous situation because it can lead through disillusionment to even stronger resistance to new ideas. On many occasions we have met farmers who as a result of using Bordeaux mixture incorrectly and suffering accordingly have been inclined to doubt the value of the scientific approach as a whole. The moral, in so far as one may be discerned, is that any advice given must be overseen in its application and thoroughly understood by the farmer in order to prevent any failure due to misuse of that advice. Otherwise the situation will be worsened rather than improved.

Lastly, a consideration of the positive elements in land husbandry as at present practised. The crops grown in the Islands have already been considered in Chapter VII, and the physical environment for the growing of those crops in Chapters I-III. In general, Maltese farmers employ on non-irrigated land one basic crop-sequence which is, to a degree varying with the individual, regarded as a rotation of soil-building and soil-exhausting crops. A typical succession would be:-

First year - September heavy manuring followed by winter potato crop.
- April-July onions.
- Summer fallow followed by ploughing.

Second year - September-May vetches and/or beans followed by spring potato crop.
- Possibly a small catchcrop of legumes with summer fallow.

Third year - September-May cultivation for and growing of wheat crop.
- Possibly a minor catchcrop of summer vegetables with summer fallow.

Fourth year - September-April cultivation and growing of sulla crop.

There are many variations on this pattern observable. For instance, near tal-Gonna (222), a sequence observed on good land was:-

First year - September heavy manuring - 96 bags of dung and refuse per *tomna*.
- September-December winter potato crop with dressing of sulphate of ammonia, 1 bag per *tomna*.
- January-April spring potato crop.
- May-August summer fallow.

Second year - September-April two crops of potatoes as in previous year.
- May-August onions on watered land.

Third year - September-May cultivation for and growing of wheat crop.
- May-August summer fallow.

Fourth year - September-April sulla.
- April-September deep ploughing and heavy manuring.

On the other hand in the Central Region, C XVIII c, one farmer with 42 *tmien* of dry land has at least 20 at any one time under cauliflowers. He has no rotational system as such but rather an intensive catch- and cash-crop sequence supported by heavy manuring and by the rather mysterious soil virtues of this region. He is thus enabled to harvest a cauliflower crop almost continuously

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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242 from December to September during each year, from seven or eight different plant strains.

On irrigated land, an even more intensive succession of vegetables, cucurbits, tomatoes and potatoes is seen. Further variants resulting from the addition to the crop range of tree-crops have been illustrated in Chapter VIII.

Accessibility to markets, as well as general environmental conditions, produce the regional variations already discussed. On a smaller scale still, minor distinctions of climatic and soil types produce minute differentiations which are all-important to the Maltese farmer. Land husbandry may then be said to be controlled by the following forces. First, and particularly affecting the older generations, is the survival of a primitive urge to control land and to maintain it as the basis of subsistence. This now implies that cultivators who normally rely on sales of their produce do in large measure base their husbandry on non-commercial standards. The social and economic background already examined in Section II is thus responsible for making Maltese cultivators a pseudo-peasantry. A recent compilation of farmers' opinions and attitudes shows this very clearly (9). Secondly, and superimposed on the first factor, are the commercial forces which, through the demands of the market, are breaking down the old inbreeding of ideas. Because the internal market for agricultural produce is still rather undiscriminating and because marketing systems are still crude, the new demands on husbandry are partly inconsistent and partly uneven in their effects (Chapter X E). Thirdly, and because of the characteristics of these first two elements, the physical environment still dominates husbandry practice. In some countries, such as the United Kingdom, within broad limits one can say that available techniques, readiness to use those techniques and the dominance of the profit motive all combine to neutralise many environmental variations. In Malta this is not true.

Maltese farming, having already developed so well from a simple peasant basis is now faced by a last hurdle before it can play a necessarily major role in the economy of Malta. Traditional experience has now to be translated into a scientific idiom, application of 'rules of thumb' replaced by an understanding of the processes involved. Without that idiom and without that understanding, imported ideas and techniques will not survive transplanting. Given such a mental renaissance, good husbandry is possible to cultivators already capable of careful hard work.

232 Livestock husbandry, faces the same sort of problems as does land husbandry. The main difference results from the more concentrated impact of new needs on traditional methods. Little is known of Maltese livestock during or before the nineteenth century. John Galt, in 1812 (10), asserted that the first milch cows were introduced by the British in 1809, a statement later re-affirmed by Macgill (11). Boisgelin (12) and Giacinto (13) in 1805 and 1811 do little more than comment on the high quality and repute of the indigenous breed of asses and goats and on the poor quality of the sheep. Even in 1911 (14), the Inspector of Agriculture, F. Debono, was able virtually to ignore milk production, note the near extinction of the Maltese ass, and remark that cheap meat imports allowed farmers to concentrate on non-fodder crops. In the 1920's and '30's changes were slowly occurring but they did not accelerate significantly until World War II.

The Maltese livestock farmer cast in traditional mould is still controlled by land shortage. Only in Gozo is there some grazing and exercise space for animals, and even there the practice of stall feeding is dominant. While animal needs have increased with the change in emphasis from goats and sheep to cattle and from general purpose cattle to dairy cows, the Maltese farmer has not been able, for reasons financial, mental, and of space, to meet these needs.

A preliminary sample survey of the feeding of milch cows and goats made by Charlton in 1956 brought out the following points (15). Of the total sample of goat-herders, 80 per cent relied on wasteland *xaghra* grazing to supply forage, this proportion being higher in Gozo than in Malta. We also know that very few cattle-farmers have adequate exercise yards and none have real pasturage. Goat and cattle farmers further rely to an inordinate extent on *hariz hasis* - rough

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weed greens pulled from wallsides and fallow or abandoned fields. Sulla, green barley and the minor legumes make up the remainder of the bulk feed, except for prickly pear which is used as a summer reserve fodder. Concentrates in the form of cake and beans are invariably fed to cattle but cake is rarely given to goats. There is considerable variation in the feeding of calves and kids. The most characteristic feature of livestock feeding is, however, the complete lack of uniformity and the virtual absence of any rational programme of feeding of cattle. At a relatively low level, most Maltese farmers are better acquainted with goats' needs and of course those needs are fairly elastic. With cattle, as the survey showed, every possible range and combination of diet is to be observed. 'Farmers seem to have little idea about the relative nutritive values of foodstuffs such as cake and beans' (16), so that over-feeding and unbalanced feeding are normal. An extreme example is that of a goatherd, newly possessed of a Friesian heifer in calf, through a Government exchange scheme (p. 310), who stall-fed it 15 lb. of cake, 3.5 lb. of beans, one bundle of green sulla and half a sack of barley straw daily. At the same time there exists a 'pedigree complex' and the possession of an animal with a known lineage and some Friesian blood is a matter of pride.

Animal diseases are prevalent, ranging from endemic infection by *brucellosis melitensis* and pregnancy diseases in goats to contagious abortion and mastitis in cattle. Most of these result from unhygienic and inadequate accommodation. The Maltese livestock farmer, as noted later, operates on a small scale and with little capital. The provision of adequate facilities can only be done with borrowed money. Since 1956, Governmental loans and subsidies have been available for helping with the construction of stock houses, water supply systems, etc., as well as for purchases of machinery. Instruction in animal care and hygiene is also provided. Mental resistance to change is not as great in this sector as in crop-production because losses through disease are more catastrophic in their impact on individual farmers. Nevertheless, even here, the better the traditional practices, the more loth cultivators may be to accept advice. Thus in a case-study of a very efficient fraternal partnership holding some 70 *tmien* and practising mixed farming, a standard reaction was found. This partnership had no shortage of capital, and the production of an average of 50 gallons a day from 30 milch cows is high for Malta. Unfortunately, with livestock as with crops, the high degree of success attributable to their able application of traditional ideas seems to bar the way to future progress - 'A good cowman knows as much as a vet.'. At the other extreme lie the perpetually indebted small producers with insufficient land, money or even traditional expertise, for whom advice must be simple and fundamental. Here again, the Agricultural Advisory Service can only produce slow improvements.

With livestock, as with husbandry, the need for improving standards is obvious. The maximum efficiency in the utilisation of all possible resources is essential to Malta. Work is in hand, limited unfortunately by the perpetual shortage of revenue and trained personnel (a situation which is the result of Malta's peculiar evolution), in a variety of ways, from studies of balanced rations for livestock and improved crop strains even to a pilot survey of the seaweed resources of the island (17). But, before any recommendations can be implemented, they must be accepted by the farmers of Malta and Gozo.

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D. Economic and Commercial Characteristics

In 1956, Surridge (1) in a note on Co-operatives in Malta, endorsed the F.A.O. statement (2) that 'real progress in the co-operative field will be impossible so long as the essential connection between credit facilities and marketing remains unrecognised'. 241 433

Subsistence farming is not now practised in the Maltese Islands and all farmers are to a large extent controlled in their productive use of land by commercial markets. The application of capital and techniques to the land is much more than the simple provision of cheap credit.

Environmental conditions necessitate the continued and intensive use of hand labour in order to maintain in existence the artificially made fields and in order to utilise the maximum area of land. Therefore large-scale capital application is restricted to provision of better water supplies and similar public works projects. What is needed is the small scale use of capital in crops and livestock experimentation and for backing efforts in the export markets. Capital provision for land purchase should not be made until cultivators are less likely to indulge in speculative 'landgrabbing' which would result in greater problems of fragmentation, etc.

The amount of hidden capital in the countryside must be very considerable. Estimates that 80 per cent. of Malta's National Income is derived directly and indirectly from the Defence Departments cannot take into account all the gross real income in kind of the countryside - real income which never appears long enough to be measured. Present expenditure on improved equipment and better breeds of plant and livestock as well as spectacular efforts such as the building of Mosta Church go to show that, given incentive and faith in the future, the rural communities can and will deploy some considerable hidden reserves. Before any such capital will be applied, some compulsive force must operate on the farmers. [454] [434]

For centuries past, production has been largely for subsistence except for cotton and cumin seed, both exported to other Mediterranean countries. From the sixteenth century onward, urbanisation slowly created a significantly sized indigenous market and, with the disappearance of the trade in cotton during the nineteenth century, the home market became completely dominant. Some 70 years ago, potatoes became profitably exportable, while at the same time rapid urbanisation increased the size and wealth of the home market. As already noted, the domestic market for milk is of very recent origin, while export possibilities for crops other than potatoes are now slowly being realised.

Until World War II, marketing of produce was organised almost entirely by licensed but uncontrolled middlemen - the *pilkali* - who collected or accepted small lots, offered them for sale to wholesalers or retailers, and then paid the farmers the negotiated price less commission. (The details of organisation are well described in the 1911-12 Royal Commission Report (3).) During World War II, 'the evolution of internal Marketing made a great stride forward during the exigency... (4)'. This statement really means that controls were imposed on prices and marketing, controls which have basically survived to the present day. As the economics of production have become more confused with welfare policies, so the complexity of the situation has increased. All that we can do here is to sketch and illustrate the nature of this complexity. 241 441 435

The first factor to be reckoned with is that cultivators in no case know their costs of production. They have some general idea of whether a proposed price is unprofitable or not but this is not necessarily trustworthy. Secondly, while the fodder crops are not very perishable, the vegetable and fruit products which find their way out of the rural economy into Maltese markets are extremely so. While the market for such produce in Malta is not a very selective one, this on the whole has the effect of encouraging the sending to market of produce which is very liable to deterioration. In the markets, therefore, any produce surplus to clear requirements is virtually valueless. One complaint concerning the

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pithali system is that the middlemen charged commission for negotiating sales but took no stock risks. Thus, when wholesalers and retailers had satisfied their requirements, playing for safety themselves, the *pithali* merely informed some unfortunate producers that their product could not be sold. The prices attained for that which could be sold varied with the skill of the *pithali*. Since many Maltese farmers need forward credit for various purposes, it was perfectly natural that the *pithal* became not only a middleman but a supplier of credit and therefore to some extent a controller of production. The whole of this system resulted from two simple facts. First, the quantities of individual items that most farmers could daily offer for sale were so small as to make some concentrating agency a logical development. Secondly, the social legacy of dichotomy between town and country meant that the farmer was most often incapable of dealing directly with his market. Questions of literacy, language and social status still often put the farmer in a position of inferiority. The *pithali* bridged that gap. In so doing they have sometimes exploited the farmers' ignorance. Many and vivid are the stories heard of their dishonesty; one such, told by several farmers, concerned the spring export crop of potatoes in 1955. They had been told by middlemen that the U.K. market had been depressed by competition from France and Spain and that therefore the prices offered would have to be low. In fact, shippers declared that the poor quality of the 1954 crops had discouraged some buyers but that the f.o.b. prices were still very much higher than reported by the middlemen. Most *pithali* are no doubt honest but many farmers bypass them where possible and most others have suspicions - mostly born of their own ignorance.

During World War II, control of all agricultural produce had to be established and, since this time, the financial side of such transactions has been controlled by Government clerks at established *pithali* markets although the middlemen still handle the actual sales. The intrusion of Governmental financial control has not removed suspicion although it has removed part of the cause of it at the cost of a higher commission charged to the producer. The annual cost of this protection and the controls mentioned below to individual farmers and to small co-operatives is almost £23,000 (8).

Another development has further confused the situation. Stemming from wartime controls, policies aimed at controlling prices for the benefit of the consumer have replaced the old attitude of *caveat emptor*. Various methods have been adopted but they are all based on regulating maximum retail prices, directly and by fixing maximum profit margins and percentages of profit. As noted by many observers, and effectively by an Adviser on Marketing (6), such controls cannot be strictly enforced and it is impossible to make them sufficiently flexible to encourage the production virtues of improved quality and evenness of supply in time. It must suffice here to say that the marketing side of commercial agriculture is not in a satisfactory state, being as it is costly, wasteful and very beneficial neither to consumer nor to producer judging by a great number of local statements.

The local market for livestock products is very different. All milk (7) legally sold is bought by the Milk Marketing Undertaking which in practice accepts any quantity of milk delivered to the collecting depots dispersed through the Islands. There is a tendency to restrict goats' milk acceptances during the summer period of glut by relating summer and winter ratios. Many producers still have written contracts but more important than individual arrangements is the negotiating power of the K.M.H. (the union of milk producers already cited) which incorporates about half of the 600 or so registered producers in the island of Malta. The fixed and scheduled prices paid to producers bear no real relation to production costs since these are not known but rather result from M.M.U.-K.M.H. negotiations and political and welfare decisions by the Government. The M.M.U. takes full risk over wastage and excess production of liquid milk and processed milk products, but is partly able to offset losses by trading profits on imports of dried, evaporated and condensed milk which sales it handles. The M.M.U. now distributes all legally sold liquid milk, as well as its own milk products, and retail prices are fixed by announcement. In 1955-56 the result

was that gross financial loss totalled £124,000 representing an equivalent subsidy to consumers of M.M.U. products, while, if profits on imports were subtracted the figure would rise to over £200,000. The commercial aspect of milk marketing is thus completely artificial and dominated by welfare policies. Price policy, even so, has not been powerful enough to even out the immense seasonal fluctuation in production of goats' milk, roughly half the total, and the smaller but still considerable fluctuation of cows' milk.

Meat production is rather more crude. The Government abattoir slaughters all the horned cattle, most of the swine and a considerable proportion of sheep and goats. The commercial transaction between producer and butcher is usually direct. Here once more the small scale and the unspecialised nature of meat production controls all else. The 1956 Census of Agriculture recorded only nine specialist cattle breeders and 94 breeders of swine as compared with over 700 engaged in sheep and goat breeding (in roughly equal numbers). Licensed importers bring in the store cattle which are then usually sold to non-specialist farmers. Feeding standards are as low as with milch cows. There is little incentive to improvement because of the low standard set by the widespread practice of milk producers selling old and diseased stock for butchering. Pig meat and store-bull meat do command a premium but, while some 15,320 horned cattle were slaughtered in 1957-58, the average import rate of stores is only some 3,000. In the same year, 5,000 sheep (of the indigenous poor breeds) and 8,400 goats (mainly those useless for milk production) as well as 7,800 lambs and kids, were slaughtered. The commercial side of meat and, for that matter, hides and skin production, like that of milk, can only be improved as and when the arable sector of agriculture is further developed.

Lastly, we must refer to exports. For some years, the most important exported agricultural product has been the spring crop of potatoes. Some general points concerning the production and sale of potatoes have already been made (Chapter VII, pp. 205-206), but one or two points need expansion here. The main market for pseudo-early potatoes grown in the Mediterranean (harvested in April and May), lies in North-West Europe. During the earlier part of this century, Holland, Belgium and Germany were the most important buyers but, of recent years, the Arran Banner variety, which yields well as a pseudo-early in Malta, has only found favour in Glasgow. By 1955 this dependence on a single main market was appearing dangerous and since that time, as noted by Haesler in 1957 (8), more heed has been taken of consumer demand for other earlier varieties, yellow rather than white fleshed, such as the Eigenhemer. On the marketing side, some important problems remain. The virtual absence of good civilian port facilities and the dependence on lighterage puts up freight costs and discourages shippers. The middlemen and wholesale handling of produce for export is not above reproach while the only worthwhile markets expect good and consistent quality of graded merchandise. Here the deficiencies of even the most commercially sophisticated part of the community can partly negate improved efforts on the part of the producer. Standards set by the home market tend to affect the services rendered to foreign markets and before the latter can be expanded, the former will have to be improved. There is one sector in which a separate break-through has begun. Air freightage of high value for bulk merchandise (which does not include potatoes) can make distant markets accessible to medium-scale individual producers. Thus flowers, plants and seeds are to some small extent being traded by a few growers sufficiently skilled to bypass the mercantile system. This cannot be done by all but it might encourage emulation.

The whole of the marketing organisation is of course organically associated with production and the commercial aspects of production need consideration.

One of the first points that strikes an observer in the Islands is that the production of the different commodities is altogether too concentrated in time. In the case of milk, a traditional organic cycle imposed by crude goat husbandry imposes great financial strains on the centralised agencies. With crops it would seem that traditional fear of risk-taking, rational enough in a peasant economy but antithetical to the whole nature of commercialism, is now hampering

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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241 433 435 development and straining even the existing pattern. In the first place, physical environment so dominates the mind of the Maltese farmer that he categorically asserts the virtues and deficiencies of various regions and does not realise that with the techniques and crop-strains at his disposal he now can negate some of these differentiations. Thus the case-study quoted on p. 329 is atypical rather than normal. The result is that in these Islands, which have a long thermal growing season, there are very marked seasonal fluctuations in production. With cauliflowers, tomatoes, carrots and some other vegetables the produce suddenly appears on the markets, prices soar through the fixed ceilings and then as suddenly slump with glut. For the rest of the year - January to September in the case of cauliflowers, and for all except June to September with tomatoes - good quality produce is not available. Prices to the producer range from very high to zero and such fluctuations, superimposed on those caused by climatic variations, both strain the farming economy and encourage poor production. Thus some winter grown Arran Banner sold for up to 50s. per *qantar* in 1956 but only 8s. 4d. in 1958; in January 1957, unsold cauliflowers could be bought from *pitkali* for fodder at 1s. a sack, while a year later they fetched almost 1s. a *wizna* ($8\frac{1}{2}$ lb. av.).

241 464 465 Secondly, the concentration in time of the various harvests causes severe fluctuations in the demand for labour. All farmers interviewed regard hired labour as poor in quality and expensive. This is a frequent grumble in many countries but in the Maltese context there are some special implications. The number of agricultural labourers, which declined in the nineteenth century as pressure on land resources diminished holding size and encouraged cultivation by occupiers, further declined as urban employment opportunities increased. That pool which is left to some extent sets its standards of wage demand by urban levels, but more important still is only urgently required at two seasons of the year. During the first of these, March to middle May, it is needed for the harvesting of cereals, sulla, potatoes and other winter crops and for the first of the summer cultivations. The second period, about September, coincides with the grape harvest which lasts but three weeks, and with autumn tillage. The result is to elevate day-wage rates to the point of discouragement for the farmer and to lower seasonal earnings so as to repel possible labourer recruits. Merchants, vintners, fodder and food consumers and producers all suffer, and suffer needlessly when one realises the climatic possibilities for extending production.

241 433 To sum up, one may say that the farmer, although largely producing for the market, is generally unable to cost his efforts, deal on equal terms with traders, or appreciate the needs of the market domestic or foreign. This inability must be corrected because the farmer and his land are potentially capable of supplying more of the Islands' agricultural needs than they do at present, and of making a considerable positive contribution to the balance of trade which at the moment they help to distort.

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E. The Farmers of Malta

From survey work, farm interviews and detailed case-studies we have been able to distinguish certain characteristic types of Maltese farmer. The variety of practice and productivity within the pseudo-peasantry makes it impossible to take general treatment any further, therefore in this section are presented a cross-section of such types. For obvious reasons, we cannot present details which might lead to the identification of any farmer or his landholding. 241

1. THE PART-TIME FARMER

Numerically as important as full-time farmers this group, although heterogeneous, indicates the incompleteness of the recent 'flight from the land'. At the highest level, as in case-study (A), the stability given by a non-agricultural income encourages good land use.

A - A holding of c. 10 *tmiem* in two blocks of 19 irrigable field plots in Region AII, Mellieha Isthmus, produces c. 80 per cent. of the cultivator's net income. Irrigated market gardening produces potatoes, tomatoes, artichokes, cucurbits, carrots, cauliflowers, garlic, lemons and table-grapes for sale, and beans, maize, celery and turnips for home consumption. Rents of reclaimed land on Government property are negligible. The farmer maintains that he holds the land partly to support the present family of three and to enable his eight adult emigrant sons to have some 'hobby' land when they return as expected to Malta. Nevertheless, his husbandry standards and commercial acumen are good, his yields high. This type of part-time farmer is neither common nor rare.

B - At the other extreme is a policeman who, in 1950, purchased 14 *tmiem* of dry land in Region XVIIIb, ta'Qali, in order to have land to work after retirement. Of this, 10 *tmiem* is let out on annual leases, both tenants' and landlord's responsibilities being ignored, and 6 *tmiem* is 'cultivated' by the owner, carrying weed infested and diseased crops of wheat, sulla and broad beans. This is symptomatic of unhealthy economic and social conditions, viz. simple land hunger based on insecurity of urban occupations and inadequate pensions.

2. THE FULL-TIME ARABLE FARMER ON IRRIGATED LAND

The time-consuming nature of market gardening and the high value of irrigated *saqwi* land tend either to restrict the total size of holdings or to focus the farmer's attention on such land.

C - In Region XIV, two full-time farmer brothers with three dependants cultivate 7 *tmiem* in one irrigated plot (Fig. 111A). One of the brothers returned from temporary migration to Canada in 1913 bringing some capital and ideas. Their equipment consists of hoes, an American windpump and an English diesel pump. There is a well graded irrigation system of three cisterns, overhead and ground level stone channelling. The diesel pump is used for filling the cisterns, the windpump for maintaining the water level. Both farmers share equally the cost of equipment and pumping and have a family arrangement for division of labour and produce. Surplus produce is sold in the Rabat market.

D - A full-time farmer with family of 11, six of whom are adults, working on holding of c. 30 *tmiem* in Region A XV a The Blue Clay Basin (Fig. 141). Lives on a main plot of 14 *tmiem* on Blue Clay and marl. On the main part of the holding are cultivated irrigated fruit and vegetable crops. The other plots consist mainly of rock, rough grazing and carobs with some vines. Intensive arboriculture is practised with peaches replacing plums and old apple stock being replaced by vines and peaches. [231]
Livestock - 1 horse, 9 sheep, 12 pigs and 3 goats. [407]
Equipment - *mokriel* and hoes. The farmer borrows a 'rotavator' for summer cultivation and has 'access' to lorry and jeep for marketing produce. [312]
The dwelling has piped water supply. Irrigation water is obtained from

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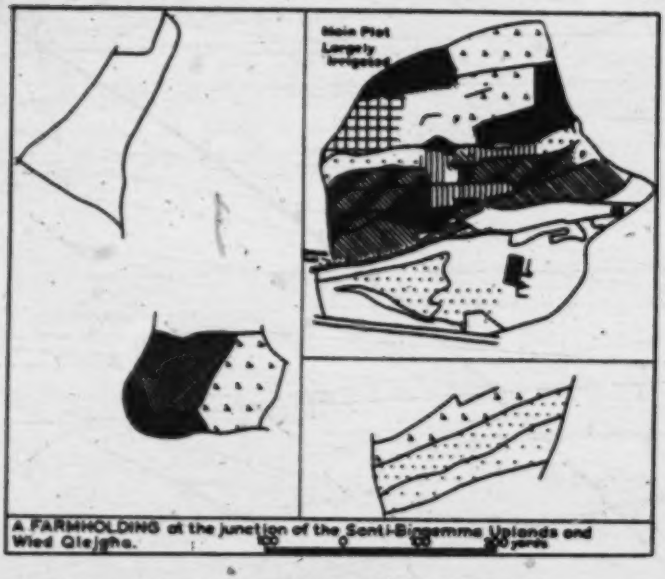

Fig. 141 A farmholding at the junction of the Santi-Biggemma Uplands and Wied Qlejgha.

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Upper Coralline aquifers overlying outcropping Blue Clay. The main supply, from a fissured Coralline cave now piped into a cistern, has only failed once (1950) since 1921. Water needs conserving in summer and is then only applied to special crops. Minor supplies come from 'wet weather' springs on Blue Clay slope.

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Soils - deep, weathered marls with thin clay beds, these latter being used for marling the Upper Coralline lands. In winter, the clay beds are too wet for most crops, e.g. during the 1953-54 season an attempt to grow wheat failed completely and, on 2nd April, 1955, drainage holes were necessary to hasten the percolation of surplus water in some fields. In summer, the clays need careful tilling in order to avoid caking. Produce is mainly for sale in Rabat market.

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3. THE FULL-TIME DRYLAND ARABLE FARMER

This group is numerically and areally the most important. It also tends to set the general standard of farming.

E - The first example of this group works land in Region CXX, the Tarxien-Ghaxaq Basin. A full-time farmer with two dependants with a fairly concentrated holding of 32 *tmien* (8.7 acres), used as follows in spring:-

3.6 *tmien* of Sulla
5 *tmien* of Potatoes
5 *tmien* of Wheat
5 *tmien* of Barley
.5 *tmien* of Broad Beans (vegetable)

19.1

The remainder is under onions, aniseed, cumin, fallow and forages. The best land has 30 inches of soil and is rented at 36s. per *tmuna*. The poorer

land, with as little as 3 inches of soil, has rents as low as 10s.
Livestock - pigs and poultry.
Equipment - hoes and one *mokriel*. The farmer borrows a horse for ploughing and a contractor with tractor and single furrow steel plough is hired for cultivating the best land at a cost of 17s. per *tomna*.
Rotation
First Year - Manures soil with dung and sulphate of ammonia.
- Plants summer crop of potatoes for lifting in September.
- Plants a following crop of winter potatoes for lifting in December-January.
Second Year - Plants and sows onions, aniseed and melons in March-April for summer harvesting.
- Sows wheat and barley in the autumn.
Third Year - Harvest cereals in June-July.
- Sows sulla, broad beans and *Widna* in the autumn.
Fourth Year - Crop fodders in March-April.
Marketing - Sells *Widna* hay (cut after seeding) and sulla hay (cut when in bloom) to goat and sheep herders.
- Sells other crops direct to wholesalers, bypassing merchants in order to obtain higher prices.

F - The second example has land in the best dryland farming central region, in this case C XVIII d. A full-time farmer who lives in Siggiewi itself with his family of eight. The very scattered fields lie between Siggiewi and Buskett, making up the total holding of 24 *tmien* (8¼ acres).

- at Buskett	- 8	*tmien* of Tomatoes
	- 3	*tmien* of Broad Beans
- at ta'Hanxiaq	- 1.5	*tmien* of Sulla
	- 2	*tmien* of Barley
	- 4	*tmien* of Potatoes
	- 1.5	*tmien* of Onions
	- 1.5	*tmien* of Broad Beans
	21.5	*tmien*

Remainder under vegetables, cumin and forages.
Livestock - 1 horse, 4 sheep, 4 goats, 1 pig, poultry.
Equipment - Hoes, two ploughs and cart.
Crop Sequence - Ploughs and manures after sulla crop.
- Plants potatoes in January.
- Lifts potatoes in April.
- Plants cabbages and cauliflowers in May.
- Harvests these in winter. Then cereals, potatoes and sulla.

If soil not manured then sequence - sulla, barley, one year of fallow, and then 'almost any' crop - usually potatoes.
Marketing - sells produce to Siggiewi *Pitkali*.

Many dryland farmers in the western half of Malta also have relatively small but important *gnien* plots. One such has already been considered from the point of view of holding evolution (Chapter IX B) and the relevant production facts may be summarized thus:-

G - The farmer, married with seven children, now works c. 83 *tmien* of dry and 2 *tmien* irrigable land in Region A XI, Binġemma Basin. Two-thirds of this is worked in partnership with a brother. The *gnien* land is mainly under apples, the most important cash crop. Three fields, distant from the village farmhouse and with thin rocky soils of a maximum depth of 12 inches over a rock platform, carry vines of ages ranging from over 30 to 2 years. Plot 4, a narrow strip of good *terra* soil is planted under vines because neighbouring small parcels carry fruit trees making it impossible to grow sown crops successfully. Plots 5 and 6, on good 18 inches deep xerorendzina soils, are most suitable for tomatoes, wheat and sulla. Plot 7 carries self-sown sulla on heavy clay, plot 8 rotational sulla. All these plots are worked

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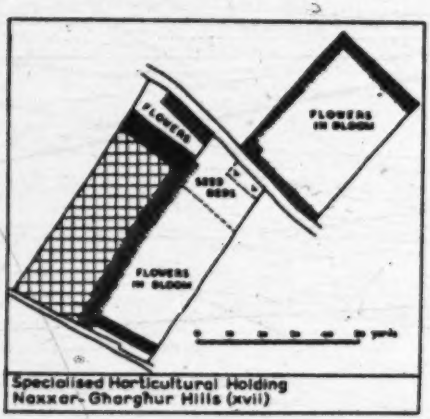

Fig. 142 Specialised Horticultural Holding in the Naxxar-Gharghur Hills.

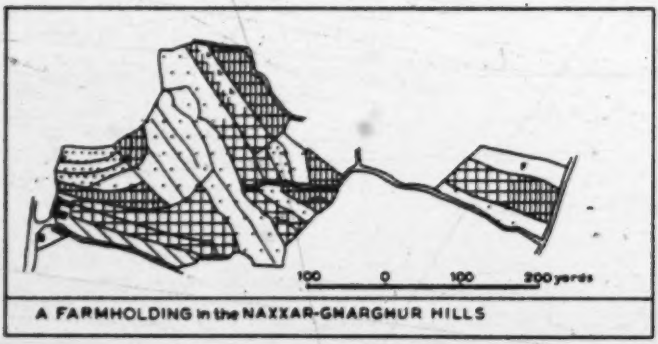

Fig. 143 A Farmholding in the Naxxar-Gharghur Hills.

241 by the cultivator for his wife who inherited control from her family. The remaining two-thirds of the land is held from several landlords in various customary partnership arrangements. On these field plots, very variable in quality, a typical land use pattern would be as follows:-

1½ plots, c. 3 *tmien*, under vines.
2 plots of six terraces, c. one-half rocky waste, one-quarter vetches and barley, one-quarter wheat and beans.
2 plots, c. 4 *tmien*, under wheat followed by melons.
¼ plot intercultivated potatoes and melons.
2 plots, c. 2 tmien, under *fiilbiena* (black peas).

This farmer, like many of his kind, obtains the greatest single return from *tmien* fruit farming and, although with very limited livestock interests, devotes much acreage to leguminous rotational fodder crops to be sold either by the field or by harvested volume. Working livestock is owned by the farmer and about half the land periodically worked by hired machinery. Produce is sold mainly through middlemen - the *pifhali*.

Such dry land farmers need about 20 *tmien* or more of cultivable land in order to make a reasonable living by rural standards. They and their families are necessarily expert in traditional ways of cultivating a considerably range of crops. Most of them rely on home raised seed except for spring potatoes and very few of them need very much liquid capital. Under normal conditions there is no debt problem. Production of individual items is generally small and, unless they have direct connections with wholesalers and retailers in nearby towns, they rely very much on the collection and sale of produce through middlemen. Their expertise is largely a matter of hard won experience of handling particular soils and crops and very limited in other ways. 241

4. THE SPECIALISED CROP PRODUCER

Lastly, there is the small group of highly specialised arable farmers. These are mainly producers of flowers or seeds and, at their highest stage of development, sell their high-value produce abroad. In practically all cases the only thing that distinguishes them from their neighbours is knowledge and initiative. The next example shows the type of indigenous development that is fairly easily attained. Here, and in the next stage of export marketing, lies one of the hopes for Malta's economic future and stability for Maltese agriculture. 247

H - This farmer and one adult son have 20 *tmien* of land in Region C XVII. Seventeen *tmien* are farmed under a relatively extensive cereal, sulla, catch-crop system, the remaining 3 *tmien* (Fig. 142) intensively cultivated under flowers - 'More profitable than normal Maltese agriculture'. A rotational sequence is practised of flowers, vegetables and a 'resting crop' of wheat or sulla. Vines are grown on wallsides. This farmer occasionally hires contract ploughing but normally hand-hoes 12 to 18 inches deep *Terra* soils and regularly and heavily applies sulphate of ammonia as well as green manure. Flower seed is imported annually from the U.K. and Holland, since Maltese strains are poor and diseased, and imported strains rapidly degenerate. Produce is sold directly in the relatively wealthy suburb of Sliema. A characteristic range of flowers together with some nine different vegetables at Easter would be:-

Alliums	Broom	Freesias	Larkspur	Narcissi	Tulips
Anemones	Carnations	Gladioli	Love-in-a-mist	Roses	Violets
Bluebells	Dahlias	Gypsophila	Marguerites	Iris	
			Marigolds		

5. MILK PRODUCERS

Another main group of farmers consists of milk producers. Differentiation between them is considerable depending as it does on the scale of production, the efficiency of production and on whether cows or goats are kept. At the lowest end of the scale come the virtually landless small-scale producers of goats' milk. These are the last survivors of a traditionally important class of urban herders who, before the control and pasteurisation of milk, delivered milk 'on the hoof' in towns and villages. Typical is case-study:- 234

I - This producer rents 2 *tmien* of land in Hamrun, half of which is used for domestically consumed garden produce. The remainder gives some exercise space and grazing for a herd of goats varying between 50 and 30 in number. This herd, which includes some 25 milkers, is over-fed on purchased fodder, and gives an average daily milk production ranging from a winter minimum of c. 30 lb. per day to c. 70 lb. per day in summer. Individual yields are low in quantity and quality and the farmer and his eight surviving children only survive in debt-ridden existence because of the M.M.U's guaranteed prices. He has no capital or equipment and the family's food consumption comes half from the garden plot and is further supplemented by food gifts from C.A.R.E. (an American welfare organisation). There is no real future for this type of livestock farmer.

Higher in the scale come the goats' milk producers who are able to rely on fodder from their own lands. One such, in Gozo, Region I, The West, may be summarised thus:-

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234 *J* - With a holding of over 42 *tmien* in 26 plots, half of which is rough grazing, and with 2 *tmien* permanently under potatoes, this farmer is able to supply most of the fodder requirements of his 46 goats and kids, and 100 head of poultry as well as a few cows, sheep and horses. This land costs some £23 in rent. This farmer obtains a gross profit (receipts minus fodder costs) of some 14s. a day from sales of milk. At this level he, like many of his type, is aware of the crude economics of the situation and of the need for relating feed to livestock needs. Even so, readiness to experiment is confined to those sectors in which the farmer is able to base production on traditional knowledge and his own and family's uncosted labour. In Gozo, remoteness from the main milk market in the Maltese conurbation strengthens the general herdsmen's reluctance to use relatively novel milch cows.

[427] [434]

Farmers who are mainly producers of cows' milk are, *ipso facto*, economically more sophisticated than goat herdsmen. Even so, the range is considerable, particularly great since most of these 'dairy farmers' also rely on arable farming to a varying extent. Thus case-study:-

K - is of a working partnership of two friends who keep some 40 cattle in Regions C XX b, Luqa-Zejtun and C XX e, Delimara. Untypically, they hold some 100 *tmien* of land, much of which is wasteland grazing on Defence Department land. The complexity and obscurity of their claims to much of the land reflects the rather unorganised pattern of production. Since they have land, they grow the standard cash-crop - potatoes - and vegetable crops for domestic consumption. About two-thirds of the cultivated area is given over to fodder crops - wheat, barley and sulla. This, together with a truck-load of prickly pear each day and cake and beans fed to capacity, suffices for the cows. The cultivators' answer when questioned on production costs is *'Min jaf?'* - 'who knows?', and they are not at all convinced of the need for balanced feeding. Cows are served altogether at the season which would be suitable for goats so that production varies seasonally with a spring and early summer maximum of c. 50 gallons daily and a midwinter negligible minimum. This of course is in inverse relation to the Mediterranean plant growing season and, as noted earlier, accentuates the seasonal fluctuation normal with goats' milk. Significantly, the families drink goats' milk in preference to cows' although some of the former is sold. Such farmers, although operating on a fairly large scale, are almost perpetually in debt and rarely have much capital.

By contrast one may find the type of producer already referred to on p. 829, case-study:-

L - This farmer, although with relatively few cattle, is an efficient and highly developed type by Maltese standards. The half of his cultivated land devoted to fodder crops supplies half of the fodder requirements of the 13 stall-fed cattle. The remainder, including beans and cakes, costs him some £1,000 per annum. *Receipts from milk sales* come to c. £1,350 per annum. This farmer, becoming interested in the possibilities of cattle-breeding, puts most of his not inconsiderable capital directly into the livestock. Arable crops, particularly potatoes and onions, bring in good gross returns but, as with fodder production, are becoming increasingly regarded as uneconomic. This in spite of the fact that the only financial records kept relate to milk sales, fodder purchases, land transactions and buildings. With farmers such as this, one finds an irrational blend of conservatism and a readiness to try new ideas such as artificial insemination and balanced feeding.

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234 241 6. MIXED FARMERS

Lastly there are the mixed farmers, which in Malta and Gozo usually means farmers who for one reason or another have neither become very reliant on the 'milk-cheque' nor are able to grow irrigated or specialised crops. These farmers, usually middle-aged, have little capital, a modicum of enterprise and reasonable dry-land but the lack of agricultural interest shown by their sons discourages much development. They tend to be opportunist in outlook and fairly

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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efficient as judged by yields. This is the group mainly responsible for the fairly steady progress made during the last 30 years but their productivity is neither high enough for modern needs nor attractive enough to ensure family succession on the land. A typical example is a composite case-study:- 234 241

M - In Region C XVII, the Naxxar-Gharghur Hills, lies a holding of 40 *tmien* (Fig. 143). Two wells supply water except in high summer. The 60-year-old farmer and his wife live in a relatively new farmhouse, an older dwelling with byres now being used to house six Friesian cows, seven goats, a horse and a mule. The grown-up children have either emigrated or work in *'il-Belt'* and have no interest in the land. The farmer built up his herd in the period after World War II and would like to increase its size but realises that he could not handle any more stock. About 5 *tmien* of land is usually under potatoes, small plots carry vegetables for home use, and the remainder grows fodder. This allocation results partly from the swing towards milk production but also from the high cost of hired labour to work the land. Husbandry is fairly good but the farmer confesses his technical ignorance and has no younger generation on the farm to encourage him. He keeps no accounts since 'this is the way he lives'.

Many other examples of sub-types of Maltese farmer could be given, ranging from the highly organised syndicate of five brothers which practises successful mixed farming in Region C XVIII d, Siġġiewi but which, almost as a result, is highly resistant to change; to the fruit and vegetable farmers of Wied San Blas in Gozo (Region III, Northern). Those given represent a fairly comprehensive cross-section of the producers who, within their limitations, make a fairly efficient use of land resources. Unfortunately this is not enough. All but a very few are commercially limited to an appreciation of the local not very exacting markets. In no case have we found any appreciation of costing by profit but only a more or less vague knowledge of gross returns. Everywhere there is suspicion, not vicious or pathological but quietly ingrained. It is assumed that the only way to ensure fair purchase prices is personally to deliver the produce - even to the M.M.U. It is equally natural to be suspicious of bureaucracy - a not abnormal rural phenomenon - and also of the practical knowledge if not the learning of advisers. A great many farmers are also conscious of a helplessness, of being left behind by the cunning of the city. This too is a not abnormal country attitude but, seen in the context of the whole social nexus, it is dangerous. 241 829

Note: For a fuller consideration of some case-studies see P. K. Mitchell: 'Studies in the Agrarian Geography of Malta'; Part II, 'The Maltese Farm'. Report to C.E.R.C., Durham, 1960, and B. W. Boxley: 'The Farmer and Rural Society in Malta'. Report to C.E.R.C., Durham, 1960. 113

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F. The Farmer in Maltese Rural Society

241 571 A study of the Maltese farmer within the total of agriculture in the Islands must include a consideration of the individual as a member of the community in which he lives, works and thinks.

The total social environment of the Maltese countryman may be seen as three concentric circles - family, village, and 'Malta'.

241 619 To the Gozitan who has never crossed the sea to Malta and to the old countryman for whom Valletta is a foreign world, the concept of 'Malta' is something large and indeterminate. But even for most of the rural population, for whom Valletta and the towns are becoming a familiar part of experience, the Islands are large enough for the countryman to feel none of the claustrophobia of which visitors to Malta complain. The 'National' unit is large enough for him to speak of *'Il-Gvern'* - the Government, of which he has heard frequently, though imprecisely, on all sides and on which he blames many of his economic and social problems with a characteristic disregard for logic or even fact. This concept of *Gvern* is of importance in an appreciation of rural thought in Malta. In it no very clear distinction is made between Maltese Government and the Imperial side of the Dyarchy. Neither is allegiance to one or other of the political parties very significant, for personality is always more important than party.

[178] To give an historical perspective to this attitude of the remoteness of *Gvern* one may see in it not only the product of foreign British rule since 1800 but also the legacy of the 'paternal' government of the Knights of St. John during their previous two and a half centuries in the Islands. Rural communities are characteristically conservative.

793 The other Malta-wide authority is that of the Church, but the summit of this is scarcely less remote to the individual than is *Gvern*. In the normal practice of his Religion the countryman leans directly on his local priests, though the Curia and Archbishop in Malta and the Bishop in Gozo do represent, for him, the essential unity that is the Maltese Church.

241 178 369 Within the framework of 'Malta' the distinction between the conurbation of towns, centred on Valletta, and the countryside is crucial. This 'conurbation' may be defined as those census districts with less than 3 per cent. of their working population engaged in farming. In 1948, this accounted for all districts bordering on either the Grand or Marsamxett Harbours together with the adjoining residential suburb of St. Julians (1). Outside this urban area, the farming element in the working population increases towards the west and north of Malta, although only in Mgarr does it pass 50 per cent. In Gozo, the scene is notably more 'rural', on the basis of this definition, with six of the 12 census districts having more than half their working population engaged in agriculture.

[463] A survey of parallel information in censuses over the past 100 years shows a declining farming element along with a diversification of the occupational structure - especially in those villages regarded as traditional strongholds of agriculture.

This trend to economic diversification has been accompanied by a break away from the former social homogeneity of these rural villages. In fact, economic and social change cannot be considered each in isolation. In Malta, change - in its widest sense - has spread into the countryside from the conurbation. The tempo of this process has accelerated rapidly since the 1939-45 war, which brought town and country together more than ever before and shook the foundations of the cleavage between 'peasant villager' and 'urban townsman', a key feature in the social geography of the Maltese Islands. The appearance of schools, amenities - particularly transport, and a degree of occupational choice, have enabled the countryman to sample a more 'urban' way of life and culture and this has produced a dissatisfaction with rural society as it has been. Maltese countrymen knew they were regarded, as a class, as low in the social scale of urban opinion. They accepted this fatalistically and were in fact able to view

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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their designation with a certain tolerant wisdom. Not so the present young generation in the farming community for whom education and material facilities have presented the chance of escape from a social inferiority complex.

The village was traditionally the community-group in rural Malta. Contact with the towns and Valletta was limited, especially for the villages of the west and in Gozo, until buses, press and rediffusion narrowed the gulf, but it was hardly less than the contacts between the villages themselves. The village was the group for most social interaction. Currently, the trend is towards a Malta-wide community-group in which villages are losing much of their isolation, although there is very little uniformity in this process. Sub-urban villages are clearly absorbing non-rural characteristics much more quickly than is the case in outlying parts of the Islands.

The nucleus of village life is the Church and the first citizen is the Parish Priest. The Priest combined teaching and general advisory duties with his spiritual role (see Chapter VI C). He was also the main link with the world outside the village through his relaying of general news from his pulpit. Normally, land transfers and a wide variety of matters connected with the agricultural cycle were announced by the Priest. The Church was the social meeting place and the basis of institutionalised activity. Even the village *festa*, that single day of wild exuberance, noise, fire-works, procession and carnivalesque has as its pretext a religious observance such as the honouring of the particular Saint of the village or the National Feast of the Shipwreck of St. Paul. In all this, the link between Priest and people was often further cemented by wide kinship connexions within the village. The son of an illiterate farmer might progress through Seminary and University to return to his home village as a priest and to be claimed as a relative by many members of that static and much inter-married community.

Such proximity, together with the very number of the priesthood in any parish made for a familiarity with the personnel of the Church just as confession, fasting, observance of Saints' and other special days, quite apart from the daily Mass, made for close acquaintance with its practice.

It is convenient to use the past tense in the foregoing only because the picture sketched has been modified in recent decades. It is however still the essential basis of communal life, especially in the rural community which, as suggested, holds to traditional custom longer than does the town. The modifications which have appeared are important in this present consideration because they lie behind the current social upheaval in which the individual countryman is being faced with a clash of new against old. If, as seems possible, he leaps to the new so completely as to relinquish the old entirely, then the traditional order of society will disappear along with the agricultural system on which it is based. This is the problem of the farmer in Maltese rural society.

An early non-religious movement was that of the Band Clubs; the first appeared in Rabat in 1860. But even these came to be identified with particular Churches and also with parish rivalries. The Band Club grew to become a major feature of social life in both town and country in Malta, although in Gozo it has had only a limited extension outside Victoria.

The Band Club is essentially a male organisation. Women have never been more than tolerated spectators and, to this extent, the movement reflects the place of women in Maltese society. Emancipation of women has spread into the countryside from the towns but even today women take an undemonstrative part in village activity and their movement outside the home is largely confined to Church-going, shopping and possibly field-work. The modern young woman who has had at least eight years schooling seeks paid employment beyond the house and fields. In rural circles the tendency is still to frown mightily at such a suggestion but it can only be a matter of a few years before what is now accepted in Valletta becomes tolerated in rural Gozo.

Functional diversification has been the keynote of twentieth century village society in the Maltese Islands. There is no evidence to show that there is any challenge to the position of the Parish Priest in matters religious (the situation has been less satisfactory from the point of view of the Church in urban Malta)

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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178 but there has been a delegation of his traditional secondary functions. The spread of Government primary education, for example, has produced a literate younger generation able to write - and think - for itself; rediffusion, cinemas, and television have made their presence felt; the Maltese-language press has grown in volume and scope; letters and visits from emigrated Maltese widen horizons rapidly; cheap bus transport puts most of the Malta within easy reach; health and social services have brought improvements; C.A.R.E. (2) and other relief supplies have brought a new external influence; the changing pattern of work with the new limited working day is giving the time for the novel activities made possible by cultural and material advancement. The last 50 years have seen the appearance and spread of the lay religious movements (see Chapter VI C) which have attempted to relieve the Priest of some of the work with which he had previously been able to contend unaided. The Society of Christian Doctrine (M.U.S.E.U.M.), founded in 1909, was the first of these but larger and more comprehensive is Catholic Action whose four groups for men, women, young men, and young women have been established throughout the Islands to provide the modern Maltese parallel to the Village Institute, Youth Club and Church Fellowship of other countries.

[575]

178 241 654 The rural family was traditionally the economic unit within the village. A century ago, farming in Malta implied the self-sufficiency of the true subsistence peasant rather than the crop- and milk-selling producer of today. The food for the family came very largely from the fields worked by its members, milk from their own goats or sheep and clothing from home-produced cotton and wool.

Money and matters financial now occupy a major part of the thoughts of the Maltese farmer - even of the older generation, illiterate and cut off from more cultural developments. Barter as a means of exchange is breathing its last. Perhaps more than anything else did the 1939-45 war mark the change. During the years of siege and shortage the farmer was able to get prices for produce out of all proportion to anything before or since. With the return of conditions to normal after the war this Golden Age of Maltese farming collapsed but the farmer went on somehow expecting to make the same profits in peace as he had in war. The fact that he has not been able to do this, even with recent Government protective farming programmes of subsidies, guaranteed prices and other artificial inducements, has increased the bitterness which the farmer has come to feel for his lot. For its part, the Government has tried to keep the farming community as contented as possible and at the same time has embarked on attempts at dairy and general farming reforms of methods, varieties, marketing, etc., in an attempt to stop the retreat from the land and from the way of life based on it. The produce of the soil is, after all, Malta's only major locally-based industry. This has seemed to prove to the farmer that *'Gvern'* ought to do all that it has done for the farmer, and a lot more. The Government's recent policy has been to educate the farmer to accept the new ideas and novel methods and techniques and it has attempted to do this through lectures to farmers, programmes on rediffusion, and pamphlets - along with the inducements of subsidies and guarantees. But the limited success of this programme has emphasised the basic problem in farming today which is that the 'Farmer' is now the middle-aged or old man, whose lack of education and experience outside the community of his village makes it most unlikely that he will accept information and advice from those who are patently not *Maltese* farmers and lack the lifetime's association with the alleged idiosyncracies of the Maltese environment.

178 464 24 56 The younger generation, which has benefited from a thorough primary schooling, might have been the individuals to listen to lectures on farming but, and here is the basic problem, as a group the sons and daughters of farmers are desperate to leave the land and even more concerned to rid themselves of what they see as the social inferiority attached to the calling of their fathers. These young people have in fact been educated to an awareness of new possibilities of economic and social life outside farming and also outside the village community which bred them. So many of the younger generation have in fact managed to make the break with the way of life of their fathers that the average age of the Maltese farmer is now higher than only a few years ago, and is still rising (see Section III Introduction).

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

In terms of the social pattern of the rural village, this means that there is a very significant distinction to be made between the older generation of farmers proper and the younger generation whose direct attachment to the land and farming is weaker if not already broken. If one turns to a consideration of the way of life and living standards in the village community this gulf is apparent. Most spectacular perhaps are changes in clothing. 178 241 561

The familiar working garb of the farmer has been the heavy woollen vest, cotton trousers, waistcoat, and cap. Recently, army-surplus shirts, denims, etc., have replaced the locally-made garment, often of home-grown cotton, while the cummerbund is now rare. Sandals are normally worn for walking but not for work. The farmer who works round the clock has never had a 'best suit'. He attends Mass in his working clothes before going to the fields and, on Sundays and holidays, ventures forth as on any other day with the possible addition of a woollen cardigan or more presentable waistcoat. For women, the use of the *faldetta* ribbed hood has declined rapidly in the last 20 years and is now only worn by the older women in the villages and by female members of the M.U.S.E.U.M. movement. The use of black generally by women is declining but most clothes are still made in the home even if from bought material rather than home-produced cotton or wool. The younger generation are not usually content to venture forth dressed in the manner of their parents but insist on making their own appearance as much like that of the average town-dweller among whom they aim to move socially. The white shirt, smart suit, shoes, socks, and well-oiled hair of the young men and the bright dresses, high-heeled shoes, nylons and cosmetics of the village maidens are regarded as the essential uniform of the seeker after the bright lights of Valletta and the towns. The schools have played a part in this with their demands on cleanliness, footwear and dress in the classroom. Occasionally a child goes bare-foot to a village school but no one would think of visiting Valletta shoe-less. The imitation of urban standards of dress is particularly apparent in the sub-urban districts where the farming minority are at pains to 'keep up with the Vellas' in dress - in spite of the expense involved. 178 291

Diet in the traditional rural scene depended upon what could be produced by the fields and animals held by any family. The standard soups and stews (such as *minestra* and *brodu*) were consequently largely vegetable. Meat was rarer, fish seasonal and small birds might be added to a stew depending on the results of the hunting or, more correctly, shooting which was and is a popular Sunday and Holiday pastime in the countryside. The diet was rather less 'Italian' than that in Valletta and the towns, with potatoes in place of the various forms of farinaceous paste - spaghetti, macaroni, etc. As in the rest of the Islands before the 1939-45 war, milk was taken fresh from goats and sheep and was not infrequently disease-carrying. Tinned milk is now popular in town and country but consumption of bottled, pasteurised milk is growing. Tea and coffee drinking have to some extent replaced local and home-made wines, especially in the many bars and small cafés which have become the leisure-time resorts of the men of the villages between strolls in the squares and streets. Even here change is evidenced, for the traditional guitar-accompanied *ghana* of the Maltese peasant has given way to *Radio e Televisione Italiana* as the basis of café entertainment. 178 [262] [272] [533] [807]

This very increase in leisure time is significant. The old farmer is content to spend the greater part of every day with his animals or in the fields for they are in fact his hobby as well as his livelihood. Cinemas and bright lights hold no attraction for him; but the young man insists on recreation as he sees it in the towns. The timetable of the farmer varies according to his type of farming. The herdsmen's life is ruled by the routine of feeding and attention demanded by his cows or goats and by the times of milk collection demanded by the Milk Marketing Undertaking. All this means an earlier daily start (sometimes 1 or 2 a.m.) than is usual for the field worker who begins his day with a 4 a.m. or 5 a.m. Mass and then stops for a light breakfast some three hours later. Lunch-time is 11 a.m. or noon and is followed by a *siesta* of some hours, depending on the season and the pressure of work to be completed before the sun goes down and the field-worker shoulders his hoes or his wooden plough and returns home 512

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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for the evening meal, Rosary, and sleep. Electricity has made his time-table only slightly less dependent on the times of the rising and setting sun.

Increased spending-power, a more varied diet now including a variety of preserved and non-local foods, and the replacement of home-produced cotton by purchased materials for making clothes, have all contributed to the extension of shopping facilities in the villages. Apart from the 'general store', specialised shops have also made their appearance - butchers, pharmacists, clothing shops, and so on. The 1939-45 war brought flour and bread rationing and the end of home-baking - hence a further village specialisation (see p. 182). Since the War, the number of vans touring the countryside every week has increased rapidly to bring a variety of wares to the door of even the most lonely farmhouse. The *petrolju* van was early in the field, for the rural Maltese have long relied on paraffin for both cooking and such heating as the houses receive. Yet another addition in recent years to the diet of the poorer classes has been the free distributions of food (cheese, rice, corn-meal and flour) made by C.A.R.E. and by Catholic Relief Services (cheese, beans, flour, etc.), another organisation distributing surplus United States food supplies abroad.

Village housing is changing more slowly. The traditional Maltese rural home was a flat-roofed dwelling built round an enclosed courtyard, from which a staircase frequently led to an upper floor. The courtyard was the centre of domestic life and much of the regular work of the household was done here. A door, large enough to take a cart, opened on to the street. Windows on outside walls were small and rare. In many of the older parts of the villages, accommodation for animals and stores adjoins the rooms occupied by the family, the whole forming a compact economic and domestic unit. Water was carried from a village pump and sanitation, if any, was limited to independent cess-pits requiring periodic emptying. In winter such premises were liable to be very cold; in the heat of summer the rough roads of beaten earth readily produced a fine dust which can only have had harmful effects on the widespread trachoma and similar ailments.

Nowadays much of this survives only in the memory of the older people. Only some village streets in Gozo are not now surfaced; mains sewerage has been extended to all the larger villages of Malta; electricity is absent only in north-western Gozo; familiar red telephone kiosks have appeared all over the islands; the larger villages in Malta have cinemas, in addition to much older Band Club buildings.

The essential features of the village society within which the Maltese farmer lives today may be summarised thus in conclusion:-

Economically, there has been a change from the independent, subsistent family unit to a diversified and inter-dependent occupational structure in the village, along with a realisation of the impossibility of maintaining Maltese agriculture in its traditional form without 'artificial' support. Materially, the village is seen to have benefited from a wide range of developments which have improved it as a place in which to live for the Maltese countryman with his now greater range of demands - and the buying-power with which to achieve them, thanks to war-time siege and subsequently to Government subsidy and guarantee. Socially, literacy and the awareness of a different way of life beyond the village have brought to the younger generation an intense dissatisfaction. Dissatisfaction not only with the social regime of the village, even in its present broadened and functionally diversified form, but also with the farming on which the community has depended.

Thus farming in its present form is waning and the Maltese farmer as he was in the recent past - and still is among the older generation - is a disappearing individual. If the clash between the present younger generation and the old order can be resolved and if the retreat from the land can be stemmed at all, a different kind of agriculture will emerge with a new type of farmer and a changed rural society.

REFERENCES

1. Census of the Maltese Islands 1948. Table 53.
2. C.A.R.E. - Co-operative for American Remittances to Everywhere.

Note: For a fuller consideration see B. W. Beeley: 'The Individual and Changing Rural Society in Malta'; Ph.D. Thesis, Durham, 1960.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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SECTION IV Chapter XI

An Assessment of the Cultural Landscape

In this book we have attempted to portray the Maltese Islands 'in the round'. Deficiencies and omissions occur; the former unfortunate, the latter equally unfortunate but also deliberate because of space limitations. Nevertheless, we believe that our study, such as it is, has illustrated certain points of value. First, and this is a geographical truism, the relationship between man and the land on which he lives is infinitely complex. In the case of Malta this relationship is also astoundingly complete and coherent, so that alteration in any one part may provoke repercussions on all the rest. Hence, under these circumstances, change of any kind should be introduced with extreme caution; it has been demonstrated that lines of action which seem apparently well-found and reasonable at the time of inception can have wholly unforeseen and unintentional consequences. This warning has a general as well as local validity. Further, and in the light of this situation, it becomes essential to have as full a knowledge as possible of local conditions before undertaking action. Such knowledge can only be acquired through observation, which must be as complete and detailed as financial resources allow.

Thirdly, investigation of the use man makes of his surroundings leads to the conclusion that, in a last analysis, it is not the actual physical conditions which control man's activities - it is the view that man himself takes of what can or cannot be done which really matters. From the physical standpoint Malta is a highly typical Mediterranean country, yet we still do not know why the vine and the olive, these most characteristic plants, have hitherto only made temporary invasions of Malta. We do however know that the factors behind this were not physical - e.g. climate or to do with soil. It would thus seem to be the way man actually estimates the physical potentialities of his home region that governs what takes place - put in another way, we may say that environment finally exists only in the minds of men. In such a form it can appear intractable, offering insuperable obstacles, and mysterious in its effects. Hence, resource use should not be thought of solely as a routine controlled by physical media, but as a process in which temperament and attitudes of mind are involved. Recognition of the human factor as indissolubly associated with the physical elements of geography underlies our approach: and it is in this sense that our subtitle 'Background to Development' should be interpreted.

Lastly, there is an opportunity to draw together some of the threads which we have unravelled from the general weave, and summarise the main themes.

The principal conclusion is that everything one sees in Malta, other than the major topographical features, is man-made and man-maintained in existence. For this reason there is an unstable equilibrium that eternally threatens to collapse.

Physical environment is fundamentally harsh. The component rocks consist almost entirely of fissured and fractured Tertiary calcareous series, mostly of Miocene age; and natural accumulation of relatively insoluble inorganic soil aggregates is very slow everywhere except on the narrow outcrops of the Blue Clays. There is complete absence of surface water and subsurface moisture is small. Only in the western half of the island do non-saline water-tables now rise near to ground level over appreciable areas, and only in one restricted area in the east - at Marsa - has this been even historically important. Malta has a highly accidented topography. The western half of the island is heavily faulted and forms a region of scarpland and faulted basins. The eastern area has more subdued relief particularly in its central and eastern parts, but even here the legacy of gorge formation - the dry wieds of Malta - during the humid late Pleistocene, and the small scale erosional etching of all major and minor geological and structural junctions have resulted in there being very little land of low gradient.

132 The Maltese climate is characterised by variability rather than by extremes. Most of the complex elemental combinations, as far as we can tell at the moment, tend to inhibit soil and plant development under natural conditions.

The annual precipitation average of 20.5 inches is largely meaningless - the variations from one year to another for each month in which there has been recorded any significant rainfall are all several times the mean values. Very high insolation and evaporation rates, from the end of April to the beginning of October, further reduce the effectiveness of scanty and variable precipitation. Much of the rainfall of spring and autumn is associated with violent frontal storms and is sufficiently concentrated in incidence to produce ephemeral torrents and cause considerable erosion.

Wind incidence is of peculiar importance. The maritime air streams are generally of high humidity and velocity. The dominant Northerlies, in particular the stormy *Majjistral*, with high humidity and relatively low temperatures, have a biological effect bleak enough to produce a very clear ecological pattern controlled by aspect and shelter. The soil line in the lee of the ridges which lie transverse to these North to West winds, rises higher to the south east with the cumulative sheltering effect. On a small scale, windbreaks of stones, wattle hurdles and even cereal hedges, become of importance. The *Xlokk* comes as a warm humid wind of usually sufficient velocity to force plant transpiration rates above the critical points. The occasional humid still air conditions in winter delay germination and encourage fungus diseases while all summer winds heighten evaporation rates and cause actual soil blowing.

One of the few biologically favourable climatic features is the absence of a thermal dormant season. Mean monthly temperatures are consistently above 50° Fahrenheit, frosts are very rare, and diurnal ranges small. On the other hand, the associated high summer temperatures even though ameliorated by sea breezes produce considerable physiological troubles in plants and livestock. It is significant that over 80 per cent. of the flora now found in Malta are of North African rather than European type.

133 In the absence of human interference Malta must have been, as it still is in many areas, largely a barren karstic waste relieved only by a few basins and plains such as the Wied tal-Pwales and the Wied il-Ghasel. On the hill and ridge tops Terra Rossa formation takes place in solution hollows. On all slopes with gradients greater than 5 per cent., and on all but the most wind sheltered flatlands corrasion and movement, often exposing great stretches of bare rock, are dominant. Only in a few basins, such as the erosional Wied ta'Mazza or the tectonic Bur Marrad in the Wied il-Ghasel, does deposition become important.

In this harsh environment man created the land on which he could live.

134 Malta has few true soils but, rather, laboriously garnered and transported
311 inorganic material, carefully built up with humic additions, terraced and walled into place and irrigated wherever possible. For millennia this making of *'campi artificiale'* has gone on and may still be observed, so that some two-thirds of what Bernard Shaw called 'a heap of stones' is now cultivable land. This process of the extension first of hydroponics and then of true farming over bare rock and the reclamation of unhealthy lowland has meant the creation of new and precarious balances. The artificially produced thin pseudo-soil is not self perpetuating. The underlying rock must be regularly chipped away, the solution hollows periodically harvested. The texture must be maintained by the addition of organic matter and by frequent working. The level of nutrients must be kept up with dung and fertilisers and the water content supplemented by irrigation. The terrace walls need constant repair.

In each case there is a sharply critical point beyond which action spells danger. The use of refuse brings bacterial and virus infections, frequent tillage produces a clean surface vulnerable to erosion, the use of irrigation water and artificial fertilisers raises soil salinity. Extension of the soil cover decreases the rate of percolation replenishment of the subterranean aquifers by rain water. Malta is now in fact living on capital as far as water is concerned.

241 There have been similar critical points in crop values. When water is available, the potential crop range is large - bananas grow in barley patches, date-

palms and pomegranates alongside potatoes - but in no case are conditions optimal or yields very good. In the comparatively closed economies of the past this mattered little; in an era of world trade and world markets Malta has now been left behind. Large-scale cotton production has virtually ceased and that of citrus fruit is declining; viticulture is of low standard and the olive tree very rare. Cereals can now provide only a tiny fraction of local needs while fodder production is limited in season and type by water shortage. 241

The critical phase in the social and economic reactions to the physical situation has also been reached. In the simple peasant communities of the past, the creative manual effort was necessarily associated with a low valuation of individual human effort and an arduous and restricted life. Now, however, economic and social opportunities and desires have widened and with them has come impatience with the demands imposed by the artificial landscape. 178

Higher per capita productivity to assure more freedom and leisure is only quickly attainable by technical and mechanical innovation. It is just such innovation that is impossible on a large scale on the land of Malta. 182 241

The slope analysis map (Fig. 28) illustrates one aspect of the problem. Maltese soil 12 inches deep needs, as a minimum amount, terracing at horizontal intervals of about 20 feet. Anything wider in the way of fields or a deeper soil makes essential increasingly higher and stronger retaining walls. The problem is such that considerable control is exercised by dip as well as gradient. The amount of labour involved in maintenance is heartbreaking by modern standards and yet, without it, erosion is quickly followed by the complete stripping away of the soil down to bare rock. The scale of farming operations often has to be very small - the planting of single rows of beans, of single trees, the sowing of chick-peas in rock crevices. Power and tool application is severely restricted. Small and light implements and single draught animals or more recently 'rotavators' alone can negotiate this type of terrain and work very thin soils covering rock platforms. The dangerous effect of the abandonment of any land is obvious. The past has in fact enchained the present. If cultivation is to continue then in order to preserve the artificial ecological balance, created with such effort over the centuries, a social imbalance will become even stronger. Whatever the scale of farming the farmer will always have to grub for soil, build his terraces, carry his plough or manhandle his rotavator for long hours under conditions that will seem less attractive even than those of casual dockside and urban labour. 311 [134]

The first point then is that the landscape indicates how human effort is pinned down by the artificial environment and how restive man is becoming.

The second theme is concerned with the reasons for the historical process of what really amounts to landscape gardening, and with the underlying implications. 175 241

Malta's wealth, in historical times at least, has come from a large extra-territorially derived income which has resulted from the Island's positional value. It is possible that even in prehistoric times Malta was never self-sufficient. The great temple building cultures of Malta and Gozo may well have maintained their master masons on imported wealth. Certainly Carthaginians, Romans, Byzantines, Arabs and Normans all occupied Malta because of its strategic position and took wealth in rather than removed it. The Order of St. John held it as an outpost of Christendom maintained by the Knights' possessions on the European mainland. Britain has similarly supported the Island's economy in return for its use as a naval, military and more recently a strategic air centre. Because of Malta's positional importance its inhabitants found it necessary and worth while to create agricultural resources. Because Malta has usually been an outpost the society and its works have attained the unstable equilibrium of a siege life. 648

At least since Arab occupation a duality has appeared in the community. Earliest at Mdina, later in the Three Cities, then in Valletta and the whole Grand Harbour complex, and now around the naval, military and air bases, the garrisons have formed successive nuclei of a cosmopolitan and sophisticated community. This community, literate, trained in the professions and trades has 369

1/A [See pp. 98-B and 98-C -- Analyst]

369 formed a facade behind which has hidden an old slow-changing and parochial Malta.

The towns are Italianate in character, the farm buildings archaically indigenous; the city dwellers speak a Maltese liberally sprinkled with European loanwords, the countryfolk's language is more strongly semitic. The urban place [103] names are usually historical or religious in character - Valletta, Kingsway or Strada Reale, Triq San Pietru; in the country one finds the older elements - Zebbug, place of the olive, Hamrija - red soil, Kalanka - hard stone. The Three Cities themselves have two sets of names - Kospikwa, Senglea, Vittoriosa for the Knights and their successors, Bormla, Isla and Birgu for the people. Architecture, language, place names, consumption patterns, even temperament still divide the two sections of the community. The farmers' forebears who helped to build Valletta on the barren Xibberas peninsula, and the citadels, the coastal towers, literally built a stone curtain which cut off their descendants from the outside world. These two societies, one cosmopolitan, one parochially Boeotian, have existed until recently in a fairly amicable symbiotic relationship. The country produced the labour and the iron rations of agricultural produce, the cities supplied the markets and provided the basis of defence.

178 Under British occupation however, and during the social and technical revo-
182 lutions of the nineteenth century, this balance started to break down. For the
464 first time, considerable opportunities of non-rural employment became available. The high tide of pressure on land resources started to ebb in the last decades of the nineteenth century, leaving a flood mark of land laid out but never taken [166] up in the western hills. Labour started leaving full time farming, villages such as Safi lost population to new centres like Kalafrana. There has been an actual and psychological diminishing of that pressure on land resource that brought the present landscape into being. In spite of a three-fold increase in 150 years, the population rising to over 300,000, the number of full-time farmers is now probably smaller than it was 50 years ago.

178 A third estate and a new imbalance have been created. Fifty-eight per cent.
182 of the gainfully employed population works for the Government and Service
464 Departments, as compared with less than 10 per cent. in full-time agriculture. This section of the community, once it has severed its roots in the land, is also [167] apt to sever its connection with Malta. Net emigration between 1945 and 1954 totalled over 45,000 and the population total now fluctuates rather than shows a steady increase. It has been fortunate that the direct pressure on land has slackened since the demands directly and indirectly to support the garrisons have grown with inexorable inevitability. Forts, naval bases and airfields, storage depots and houses - many more houses, have devoured scanty land. This conflict of interests has always been present - long before the conflicting needs of flying boats and fishing fleets caused trouble in 1956. The breaking down of the old equilibrium is caused by a variety of forces and in turn further strengthens these forces. Environmental limitation of personal opportunity has become as irksome as the desire for national political independence and the necessity for economic dependence. Social policy urged on by growing needs is hamstrung by natural poverty. In town and country alike a painful groping towards a new equilibrium at a twentieth century level is manifest.

Lastly what of the response to these challenges? What are the reasons for the slowness of recent adjustment? Fear, lack of security, the very factors that made Malta important as an outpost and earned her a George Cross are also responsible for many of her difficulties. The distribution of settlements is one indicator of this fear. In the traditional area of invasion and attack, the broken lands of the West, there occurs only one town, Mellieha, and even this, hidden from the sea in a defensible position, has only grown rapidly in the last 80 years. Another indicator is the strength of the Church and the general devotion it commands. Vast wealth and effort has gone into the building and adorning of the individual churches - symbols of one type of guardianship.

178 Fear - inherent or acquired - has hindered development in many ways.
182 Industry and commerce have never fully flowered because local capital has always
454 flown to areas of less risk. How can it be blamed? Even 25 years ago, who would

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have guaranteed that the United Kingdom would not have abandoned Malta in the event of war in the Mediterranean? Those Maltese possessing power and knowledge traditionally have had too much to lose by local investment. The inadequacy of commercial port handling facilities, the paucity of processing industries, the shortage of credit, all these are products of fear. 178 182 954

Moreover, the changing circumstances of Mediterranean life which have increased security have also deprived Malta of her most easily earned income from entrepôt trade and her value as a calling station. The old commercial and financial attitudes of the most sophisticated part of society have become anachronisms in a new age, but still remain locally very deadening in their encouragement of hand-to-mouth activity.

What of old Malta? There the problem is one of breaking down isolation and correcting mental indigestion. The farmers of Malta have been commercially minded and experimentally inclined for centuries. Production for sale and exchange is the rule rather than the exception. But in fact they have little knowledge of commercial possibilities nor are they able to deal on equal terms with merchants. Often prepared to try new crops and equipment, their ignorance concerning the processes involved produces unhappy results. In short, the rural community in its partial isolation has seized with avidity a few crumbs of opportunity and knowledge and has never properly assimilated them.

It is a divided Malta that has met the new challenge, each sector too burdened with its past to respond vigorously on its own initiative.

The historic creation of an artificial environment has imposed severe restrictions on methods of utilising land, both now and in the future. The historic reasons for that creation have produced an ambivalent society, one part hampered by fear, one part hampered by ignorance. The main need now is for political security and a certain amount of economic stability. With security and stability the extrovert community may plough in its wealth rather than keep it poised for flight. The introvert rural community can then in turn translate its traditional experience into scientific idiom. In a suitable socio-economic climate and in an undivided society, many things could flourish, export market gardening and horticulture, processing industries, tourism, entrepôt trade and even sub-tropical research and training. Without such development, as is already foreshadowed in the landscape, Malta will become stagnant, depending on war and rumours of war for anything more than starvation level existence, while the landscape itself will reveal more and more of those rocky bare bones so decently interred in the past.

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[For additional data on types and examples of land tenure, see category 116, pp. 289-316.]

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[For additional data on land use, see category 116, pp. 190-288.]

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[For additional data on general aspects of agriculture, see category 116, pp. 235-288.]

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[For additional historical data, see category 116, pp. 109-146.]

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[For additional data on climate, see category 116, pp. 48-81.]

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[The place names for which the numerals on the maps on pages 192-A and 192-B provide a key can be found in scattered references on pages 238 and following.]